

AMERICAN FORESTRY

THE MAGAZINE OF THE AMERICAN FORESTRY ASSOCIATION

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AMERICAN FORESTRY

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NO. 277

THE WILLOWS

IDENTIFICATION AND CHARACTERISTICS

BY SAMUEL B. DETWILER

THE willow is an everyday tree, so humble that some one has called it "the Cinderella of trees." It has long been considered the symbol of unrequited love,

and, from the time when the Psalmist recorded that the Hebrews hung their harps upon the willows and wept by the rivers of Babylon, poets have referred to this tree as the "sad willow," although it is alluded to earlier in the Bible as a "goodly tree," to be used as an emblem of rejoicing. Certainly there is nothing solemn in the shrill piping of the willow whistles that gladdens the heart of the small boy in spring time.

The willows are very difficult to distinguish botanically because the large number of species which are clearly separate and distinct have numerous varieties which grade into one another. There are about 175 different willows in the world, of which approximately 100 are found in North America. In general, the willows are native of the colder temperate regions of the Northern Hemisphere, but several are found in warm climates. The willows grow to the very limits of perpetual snow in

the mountains and no other woody plant except the birch grows so far north in the Arctic regions.

A few kinds of willows grow to be large-sized trees,

50 to 100 feet high and 2 or 3 feet in diameter, but the majority are shrubs which occasionally reach a size large enough to be termed trees. Some of the species that have their home above timber line on the mountains, near perpetual snow, lie prostrate in mats only an inch or two higher than the ground. Nature has provided many plants to clothe the waste places of the earth, and the willow is one of these. Some kinds will grow on dry soils, but mostly they are found along streams, in swamps or on moist soils. They spring up abundantly and, by rapid growth, quickly take possession of the territory suited to them. The Children of Israel were promised to be multiplied like "willows by the water courses."

The willows belong to the lowest order of deciduous broad-leaved trees, and impressions of leaves in rocks show that willows flourished when the earth was young. It is probable that they were one of the



From Pennsylvania Trees.

THE BLACK WILLOW

1. A staminate flowering branch. 2. Staminate flower. 3. A pistillate flowering branch. 4. Pistillate flower. 5. A fruiting branch. 6. A seed with hairs. 7. A winter twig. 8. Section of winter twig with bud and leaf scar. 9. A leafy branch



THE WEEPING WILLOW

The tree is very popular for ornamental purpose and in this photograph is shown in one of the situations for which it is best suited.

earliest forms of the large group of plants with netted veined leaves that produce seeds containing an embryo bearing two seed leaves. Although only those botanists who have made a long and careful study of the willows can be certain of accurately separating one kind from another, it is not difficult to learn the general characters of the willow family. The leaves have an alternate arrangement and are generally long, narrow and pointed, with an even margin that is not lobed or deeply cut. The leaf stem is short, and at the point where it is joined to the branch there are two little appendages (stipules) which may be scale-like and fall soon after the leaf expands, or which may resemble small leaves and remain attached until the end of the growing season. The smooth-barked twigs are long, slender and very flexible, swaying in the wind with such light, easy motion that "willow" has become a synonym for gracefulness. The buds are covered by a single visible scale that forms a cap over the tiny silk-lined leaves within the bud. Willow wood is soft, light and easily broken.

The flowers are massed together in dense spike-shaped clusters called catkins. They are of two kinds, each borne on separate trees. The pollen-producing flowers consist of two bright yellow stamens (or sometimes three or more) attached to a scale at their bases. The seed-forming flower is a scale bearing a small sac which terminates in a forked tip. The latter is coated with a sticky substance to hold the pollen grains that lodge there to fertilize the minute undeveloped seeds contained in the sac. Nature has designed most flowers of this type to be fertilized by the wind, but in the case of the willows the sticky pollen

is carried by insects which visit both kinds of flowers in search of nectar. The nectar is exuded from tiny glands near the bases of the scales on which the stamens or the seed sacs are borne. The flowers appear early in the spring, before or with the leaves. In a very short time the seeds are ripe and the small pod, which has developed from the seed sac, splits open and frees a cottony mass. This "cotton" is composed of dense tufts



AREA OF WILLOW GROWTH



ALONG THE BANKS OF THE POTOMAC

These weeping willows on the Mall at the nation's capital add greatly to the beauty of the Potomac River shore line and to the driveway which is just beyond them. There are hundreds of these trees, many of them quite old.

of long silky hairs attached at one end to a tiny seed like the down of dandelions and thistles.

Procrastination is never a failing of the willow tribe. Wherever an opportunity occurs for the willows to gain a foothold in soils favorable for their growth, they are quick to colonize. The seeds ripen early in the growing season and, although they retain their vitality but a short time, they have the advantage of getting a good start

long before many other trees have begun to bloom. The seeds, equipped with thin silken parachutes, float through the air as easily as bits of down. Because the parent trees usually grow near the water, much of the seed is borne away on spring freshets to be cast on a distant sandbar or mud flat exposed by the receding water. The streams carry away willow twigs and branches or entire trees growing along their banks, and these root and grow when



WILLOW USED AS A WIND-BREAK

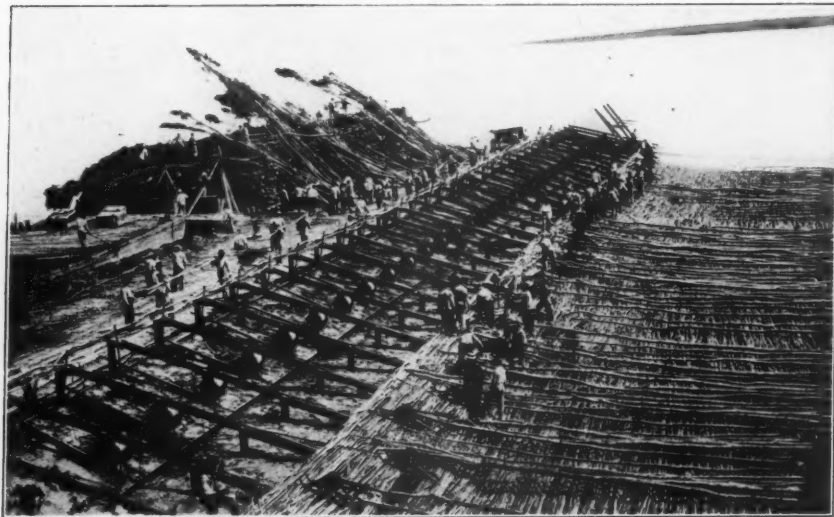
The effect of the prevailing winds is shown by the form of these white willows on a farm in Iowa. They are planted to shield the adjoining fields from the wind, and they have besides this very evident practical purpose a decidedly ornamental value.

they reach a friendly shore. The willow is easier to propagate from cuttings than any other kind of tree. A small section of a willow twig containing a bud or two, a piece of a root, or even a section of a large branch, when partly

willow leaf, and strikingly like those of the peach tree. The glossy leaf or shining willow (*Salix lucida*) is a small bushy tree or tall shrub that grows from Newfoundland to Pennsylvania, Manitoba and Nebraska. Its name

gives the key to its chief distinguishing characters; it has heavy, dark-green, glossy leaves and highly polished brown or yellowish bark on its twigs.

Pussy willow, also called glaucous willow (*Salix discolor*), rarely grows to be more than 20 or 25 feet high, and is usually a shrub. Wherever it grows, from Nova Scotia to Manitoba, south to Delaware and Missouri, its flowers are well known and welcomed as a sure sign of the coming of spring. The catkins are thick and oval, and at first seem to be covered with gray fur because of the abundance of silky hairs that clothe the flower scales, but later the catkins turn yellow as the flowers develop. The leaves are coarsely toothed on the margins, bright green above, and



WILLOWS FOR PROTECTING RIVER BANKS

On the Mississippi River these great mats are built to prevent the water from washing away the banks. In the background are seen barges loaded with willows, while in the foreground men are seen completing the mat.

covered by moist soil, rapidly forms roots and shoots, and develops into a tree. Willow twigs snapped off by the wind often take root in the soft soil in which they lodge. As may be surmised, freshly cut stumps of willow trees send up numerous and vigorous sprouts. In Europe, and occasionally in America, willow trees are pollarded, that is, the tops of the trees are cut some distance above the ground to permit the sprouts to grow into numerous large branches, forming a spreading, rounded head.

The black willow (*Salix nigra*) grows to the largest size of any willow native to America. Its name is derived from the rough, flaky, dark-brown bark on its trunk. It ranges over the eastern half of the United States, and it is our largest native willow, reaching a maximum height of 120 feet and a diameter of 3 feet. It has narrow, lance-shaped leaves, finely toothed at the edges, and the tip, or frequently the whole body of the leaf, curves to one side like a sickle. The almond-leaf or peach-leaved willow (*Salix amygdaloides*) ranges across the continent from Quebec and New York to Texas, Oregon and British Columbia. It sometimes forms a medium-sized tree 40 to 70 feet high, and is one of the better-known native willows because its leaves are broader than the usual

covered with a whitish bloom on the lower surfaces. Bebb's willow (*Salix bebbiana*) is found from the lower St. Lawrence valley to Hudson Bay and Alaska, south to Pennsylvania, Minnesota, South Dakota and through



SINKING THE BIG MAT

The mat being sunk at Slough Neck Landing, Tennessee. The foreground is seen fast to the bank, and in the background another large mat ready for sinking is visible.

the Rocky Mountains to Arizona. It has showy catkins much like those of the pussy willow. The leaves are short and rather broad, dull green on top, pale-green and hairy beneath, with prominent veins. It is a small bushy tree or shrub, and although it prefers moist soils, as do other willows, it also thrives on dry soil. Sand-

bar willow or longleaf willow (*Salix fluviatilis*) has a wide range, growing from Quebec and Maryland northwest to the Arctic Circle and southwest to northern Mexico and Lower California. It is never more than a small tree, 20 feet high and a few inches in diameter, but it is abundant along rivers and so quickly takes possession of sandbars and newly formed alluvial soils, that it is one of our most familiar and most useful willows. The leaves are 2 to 4 inches long, thin, narrow and coarsely notched on the edges.

In addition to many more native willows that are interesting and well worth study, we have imported several kinds from other countries that are widely planted and have become naturalized. White willow (*Salix alba*) is one of the most important of these. A variety of this species known as the yellow willow, because of the bright yellow color of its twigs in the spring time, is very common. It grows to as large size as the black willow and is far superior in rate of growth and in appearance. Crack

Napoleon willow. It is one of the finest examples of a "weeping" form of tree, forming a fountain of foliage. The long, drooping branches of this tree are so conspicuous and so familiar a feature in the landscape that it probably is our best-known willow.

Willow trees are always graceful and in old age they



BASKET WILLOW HOLT

These bundles of willow cuttings are placed in the pit, where they remain until the rods are cut up.

willow (*Salix fragilis*), another tree native to Europe, also grows to large size. It has earned its name from the brittleness of its twigs, which causes them to break off at the base when the branches are tossed in a high wind. It is an attractive tree, especially when the leaves turn upward and flash in the sunlight or gleam in the darkness of an approaching storm. The weeping willow (*Salix babylonica*) is a native of the East, as its appearance in the famous Chinese willow-ware indicates. It is said to have been introduced into Europe from Smyrna by the poet Pope; a noted specimen is growing over Napoleon's grave, at St. Helena, and has given rise to the so-called



A BASKET-MAKER AT WORK

These baskets are rapidly made by skilled workers, and often blind persons are unusually proficient in the craft. Many of the soldiers blinded in the European war are being taught the work.

attain to dignity. They have considerable value for planting for fuel and shelter in portions of the prairie regions and they also hold high rank for certain kinds of ornamental planting. They are nearly always propagated from cuttings, which should be made from wood of one or two seasons' growth. The use of cuttings is advantageous because it produces trees exactly like the parent, thus making it easier to propagate especially desirable varieties. The rapid growth of most willows on moist, fertile soils is a useful quality, especially where a quick effect is needed. Certain varieties, such as white or yellow willow, Bebb's willow or diamond willow, may be planted on dry soils. The pussy willows have attractive flowers and many other kinds, such as shining willow, peach-leaved willow and yellow willow, are desirable because of the beauty of the twigs and foliage. White and yellow willow are among the hardiest trees for prairie planting and the best for general planting; they are used for wind-breaks, hedges and screens. Crack willow is also a hardy and rapid growing species, and may be substituted for white or yellow willow. Weeping willow gives good effects when planted near streams or waterfalls, or it may be planted with Lombardy poplar where contrasted growth is desired.

The willows are comparatively short-lived, but possess surprising ability to repair broken tops or other injuries they may sustain. They have a strongly developed fibrous root system which is always seeking moisture. For this reason willows may become a nuisance when growing near buildings, since the rootlets will quickly enter and clog drain-pipes with open joints, and may cause trouble

by obstructing wells and giving the water an unpleasant taste and odor from the decaying vegetable matter. The roots also interfere with the flow of water in irrigation ditches. Willows have no very serious insect or fungous enemies, although they are sometimes attacked by a saw-fly larva which somewhat resembles the currant worm.

COMMERCIAL USES

WILLOW is not important as a tree for producing sawed lumber. Black willow furnishes most of the saw timber, which is logged with cottonwood and the other species with which it grows, and manufactured into box boards, lath and rough dimension stock. Some of the lumber is used for fixtures, such as show-cases, racks, shelving and tables. The total amount of willow lumber cut in 1913 in the United States was slightly less than five million feet, B. M. The lumber warps in seasoning but is fairly durable when exposed to moisture. The wood is tough because of a more or less twisted fiber; for this reason willow is said to make the best steamboat paddles, because it wears better in the water than other woods.

A considerable quantity of willow wood is used in the manufacture of excelsior; Kentucky reports

the use of 3,000,000 feet, B. M., annually for this purpose. The wood is soft and cuts easily on the lathe, and is used for wooden ware, cricket and baseball bats, and novelties. English willow is important for the manufacture of artificial limbs. Willow is also used in slack cooperage, and small saplings are split for barrel hoops and for bands for binding boxes in which nursery stock is shipped. Charcoal made from willow wood has a very fine, even texture, and is used for artists' charcoal, and until recent years was in demand for the manufacture of smokeless powder.

By far the largest amount of willow wood is consumed on farms in the form of fuel, fence posts, bean poles, and for other uses. It makes a quick, hot fire and is a good summer firewood. The diamond willow has the reputation of making a very durable fence post, and the white or yellow willow is credited with a life of seven years if the bark is removed and the wood thoroughly cured before the post is set. Fencing is an important problem in the prairie states, and one solution is presented in raising a

quick growing wood, like willow or cottonwood, and then treating the posts with creosote. The creosote greatly extends the life of the post and thus lessens its annual cost. White willow grows in diameter at the rate of about one inch in three years, and yields from one to three cords of wood per acre per year in a well managed plantation. Growth is slower on upland soil than on rich bottom soils.

Willow has a number of interesting miscellaneous uses. Cork cutters use willow wood for whetting cutting implements. The ancients used this wood for shields because

of its lightness and toughness. Willow bark furnished the South with a substitute for quinine during the Civil War, and it also yields salicylic acid and tannin. The tannin in the bark of several varieties of basket willow was found to range from $16\frac{1}{2}\%$ to $11\frac{1}{2}\%$ per cent.

Because of its



WILLOW BASKETS

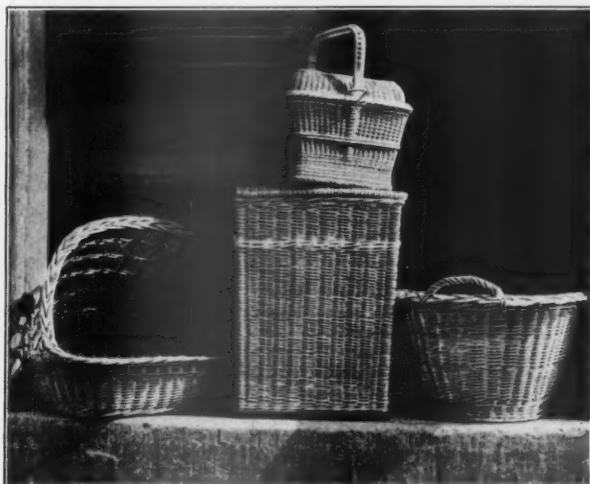
Three useful shapes which are in steady demand in many parts of the world, the high clothes-basket, the two market baskets and the smaller one, which serves several purposes.

fibrous roots, the willow has an important place as a soil-binder. It is frequently planted along the sides of eroding streams, and on embankments or sandy bottoms, to prevent the soil from being washed away. Along the Mississippi River, large quantities of the sandbar willow are cut each year and bound into fascines for building dams that force the current to deepen the main channel and for revetments that prevent the banks from caving in and washing away. Occasionally freshly cut willow fence posts are set with the bark on; these take root and become living fence posts, capable of furnishing shade for cattle and fuel for the farm.

The growing of willow shoots for weaving into furniture, children's go-carts and a great variety of baskets is an important industry. The ancient Romans regarded the willow as one of the most useful trees cultivated, and they developed a number of varieties adapted to weaving. The shoots were made into baskets, beehives and fences. During the Middle Ages the weaving of willow baskets

became important in France and Germany, and later, in England. Previous to the European war, France, Italy, Belgium, Holland, Germany, Austria, and Russia grew basket willows extensively, and had a large export trade in willow rods and basket ware.

Experience has proved that willow makes the most durable and serviceable baskets. Basket willows intended to be used with the bark on must be smooth, tough, flexible, branchless, and cylindrical, and the color of the bark must remain a light brown. Those to be used in the peeled state must have the same general characteristics, and must remain white in color when peeled. In addition to these qualities, the rods must have a small pith and straight grain in order to bring the highest market price. In many places in the United States basket willows are grown on ordinary corn land, but generally if they are planted on high ground, the land chosen is deep and heavy, but when the willow bed is subject to overflow, the land may be poorer in quality. Usually the ground is prepared as for ordinary field crops, and cuttings, 10 or 12 inches long, are planted 9 inches to a foot apart, in



WILLOW WARE ARTICLES

A fine German lunch basket, a dog basket made in New York, and a best quality Liverpool clothes-basket.

rows $2\frac{1}{2}$ to 3 feet apart, or from 14,000 to 23,000 cuttings per acre. Sufficient cultivation is given to prevent the willows from being smothered by grass and weeds.

Osier culture was begun in the United States by German immigrants, and the industry attained its largest proportions between 1870 and 1875. At present, basket willows are grown only in restricted localities in a relatively small portion of the country. In 1909, Illinois manufacturers used 108,000 pounds of willow rods, mostly imported from Holland and Germany, at prices ranging from 5 to 8 cents per pound. The last two years has seen a decided boom, both in the growing of basket willows and in their manufacture in this country. With the cutting off of supplies of rods from Germany and the curtailment of imports from France and England the price of American rods has steadily advanced. Competition in manufactured wares has also been reduced to the point where foreign goods no longer set the market price.

An attempt to replace European grown willows with imports from Japan has not been on a sufficient scale to affect the market. The importers of Japanese rods of good quality have been asking top prices for their ware, rather than attempting to capture the market by under-



A WILLOW CHAIR

The furniture of willow is growing more and more popular and there has been a steadily increasing demand for it for some years.

selling. It is probable that high transportation costs together with limited amounts of rods available account for this.

In Liverpool, New York, the largest center of the industry in this country, higher prices are ruling than ever before. Wholesale prices of standard baskets had on July 31 increased \$1 per dozen over quotations before the war. Prices ranging from 5 to 6 cents for steam-peeled rods have advanced to 7 to 9 cents per pound; the average price of sap-peeled rods has advanced from 6 to $7\frac{1}{2}$ cents per pound, with the finer grades commanding a price of from 8 to 12 cents per pound. The crop this year in the vicinity of Liverpool will be over 400 tons greater than last year, owing to the fact that many of the old willow holts which had been abandoned were cleaned up this spring. These holts will yield a crop of about two tons of green willow rods per acre this fall. The season has been particularly good in all sections as there has been very little trouble with either insects or disease.

The problem of peeling the willows still remains acute, as machinery invented for this purpose has not been satisfactory. At present willow strippers are demanding \$18 per ton for green willows and \$20 per ton for dry willows. Willow growers and basket makers are, however,

making every effort to do this work themselves, thereby reducing this cost.

The cost of peeling willows is the one thing that is holding back the willow industry in America. In Europe, where labor is cheap, this is not important, but the cost of peeling here is almost prohibitive. The only permanent relief must come through the invention of a simple inexpensive peeling device that with two men, or with a man and boy, 500 pounds or more can be stripped. Such a machine would cut in two the cost of peeling and make willow growing profitable even in normal times. Several machines have been invented but they have not been

successful, owing more to their size and cost than to the lack of mechanical efficiency. They bear the same relation to the willow growing industry that the large powerful corn sheller would to the small farmer. Unless the growers can band together and several use one machine, such machines can not relieve the situation. As the willow growing industry is mostly confined to numerous small patches, it demands a small inexpensive machine paralleling in cost and usefulness the hand corn sheller.

In spite of labor costs, however, those who have planted willows in the last two or three years are in a position to enjoy at least a temporary prosperity.

WAR STYLES IN MATCHES

THE war now strikes the match, which, of course, is a very proper thing to do with a match, but in this case it strikes at the supply and sends the cost upward. It is all because the Russian government has prohibited the exportation of aspen wood which is what

and five dozen safety matches per box. About half of the cargo was carried on deck. Quite a lot of matches you will say when you look at it that way, but that is just about enough to supply these United States for a week—and not that long when you think of the “gimme-a-match” pest.



THE VIKEN AT HER DOCK IN PHILADELPHIA

This boat brought over from Sweden 2,440,800,000 safety matches for use in the United States. Owing to the war, styles in matches have changed. They will now be shorter.

Sweden uses in making her *sikkerhetting tandstickers*, and Sweden gets most of her aspen from Russia.

The good ship *Viken* got into Philadelphia the other day with 2,440,800,000 matches aboard. These were in 5650 cases containing 50 gross boxes of matches per case,



CARGO OF THE VIKEN

These boxes contain a week's supply of matches for the United States, and represent a recent shipment from Sweden.

As a result of the Russian embargo on aspen wood the factories in Sweden have announced that the style in matches for a while will be somewhat shorter and more slender, a measure of conservation which will effect a considerable saving, but may result in some burnt fingers.

PORCUPINE QUILLS NEEDED

PORCUPINE quills are badly needed by the Indians of Michigan, writes John C. Wright of Harbor Springs, Michigan. He says:

“Some months ago I noticed an article in AMERICAN FORESTRY regarding the destructive work of porcupines in one of the western states. The article was extensively illustrated, and the author said the farmers in that state considered the porcupine a great pest and of no value whatever. In this part of the state of Michigan our Indians use porcupine quills for doing fancy work on birch bark and they make many beautiful boxes, etc., which find a ready sale among tourists and resorters. Indeed the Indians in the past have almost made a liveli-

hood that way. So you see porcupine quills are very valuable to them. At the present time these animals are practically extinct here, so that the Indians are compelled to send to Canada for their supply of quills, which make them expensive and hard to get. Of course this lessens the profit on their work, which requires a great deal of time and skill to do; and so it is a real hardship. I wish to get in touch with some of those western parties in the states where a bounty is offered on the porcupine as a pest, and let them know that the Indians here use the quills and can use a quantity every year. For the most part, our Indians are poverty-stricken and in a pitiable condition, and I would like to do something to assist them.”

SCENIC MARVELS OF SEVIER FOREST

WE hear much these days of the scenic wonders of the National Parks, for the National Parks are well advertised; but we hear little, if anything, of the beauties of the National Forests, which, up until now, remain practically unheralded. The tourist who plans a western trip arranges his itinerary so as to take in the Yellowstone, Glacier Park, Crater Lake, the Sequoias, and the Yosemite in three weeks, or thereabouts, and returns home to speak wisely of St. Mary's Lake, going to the Sun Mountains, El Capitan, and the Geysers, and is satisfied that he has seen everything worth seeing. As a matter of fact he has skimmed only a little of the cream of the store of scenic wonders of the West. The National Parks comprise a few million acres of wonderful

mountain scenery and freaks of nature. They are well worth seeing, but let no man, having seen them, think he has seen all or even the best of the western mountains.

The National Forests comprise some 150 odd million acres and are located along the main mountain ranges of the West from the Rio Grande to the Canadian line. They contain every possible form of mountain scenery from the low, monotonous, rolling foothills, dotted here and there with pine, to the stupendous, cliff-crowned peaks of the Uncompahgre or Cœur d'Alene.

Whether the tourist wishes to locate his camp in some quiet

valley by the side of a rushing stream, or to fight his way up along the hostile mountains to the jagged, windswept top; whether he desires merely the peaceful beauty of long, wooded slopes, or the soul-inspiring panorama of towering peak piled on towering peak, of rugged mountain and sheer precipice and endless ranges stretching away in the distance, he will find all his heart desires of such things on the National Forests.

Nor does the charm of these mountain fastnesses lie solely in the wonderful views to be had. The hot springs of the Boise, Challis, and Sawtooth Forests in Idaho are remarkable and interesting. In hundreds of places there are geological freaks which are the delight of the scientist, while in many others the delicate and masterful coloring

with which Nature has painted the canyon walls of some little-known creek is the despair and delight of envious mortals who try unsuccessfully to imitate her handiwork.

Perhaps no better example of these varied attractions is to be found than on the Sevier National Forest, tucked away down in the southern part of Utah, and, except for the local population, known hardly to one person out of ten thousand. Aside from its importance in protecting the water-shed of the Sevier River, the waters of which are used several times over for irrigation, and for the summer range for the cattle and sheep of the nearby ranchers,



Photograph by Arthur W. Stevens.

A VIEW OF THE TEMPLES OF THE GODS FROM THE BRINK OF THE CANYON

The black and white picture of this view on the Sevier National Forest, Utah, can give no idea of the delicate coloring. Some of the pinnacles shown here shade from a brilliant red at the base through lighter red and pink to pure white at the tip.

the Sevier has a number of scenic features which would draw forth many "Oh's" and "Ah's" and other similar appropriate exclamations from thousands of tourists, were it comprised within a National Park.



Photograph by Arthur W. Stevens.

ONE OF THE NARROW GORGES, SEVIER NATIONAL FOREST

This is one of the many small canyons between the rock walls shown in another picture. Some of them are so narrow and deep that it is dusk in them even at broad daylight.

The region is rough and mountainous. The timber is open and is broken by grassy parks and high, flower-bedecked mountain meadows. Rugged peaks tower from 9500 to 11,000 feet into the air, while others of lesser height but of equal ruggedness and roughness cut the region into a maze of cliff and precipice. Large, impassable lava beds occur everywhere throughout the Forest and from the mountain tops the spectacle of open park and broken cliff, of sharp, jagged mountain and rolling plateau, with the fertile valley far below, is a never-to-be-forgotten sight.

But the crowning glory of the Sevier is a line of cliffs extending for many miles along the eastern boundary of the Forest and locally known as the "Pink Ledges." Here Nature, the master artist—sculptor and painter

alike—has decorated the rock walls with that lavishness and skill which she has employed on so many of the world's show places. Broken by canyons and arroyos, long draws and steep ravines, these "Pink Ledges" present a wealth of color and fantastic architecture which must be seen to be appreciated. And in one of these canyons the form and coloring rise supreme above anything else on the continent, if not on the globe.

A visitor, seeing it for the first time, called it the "Temple of the Gods," and this title perhaps is more fitting and descriptive than any other which could be



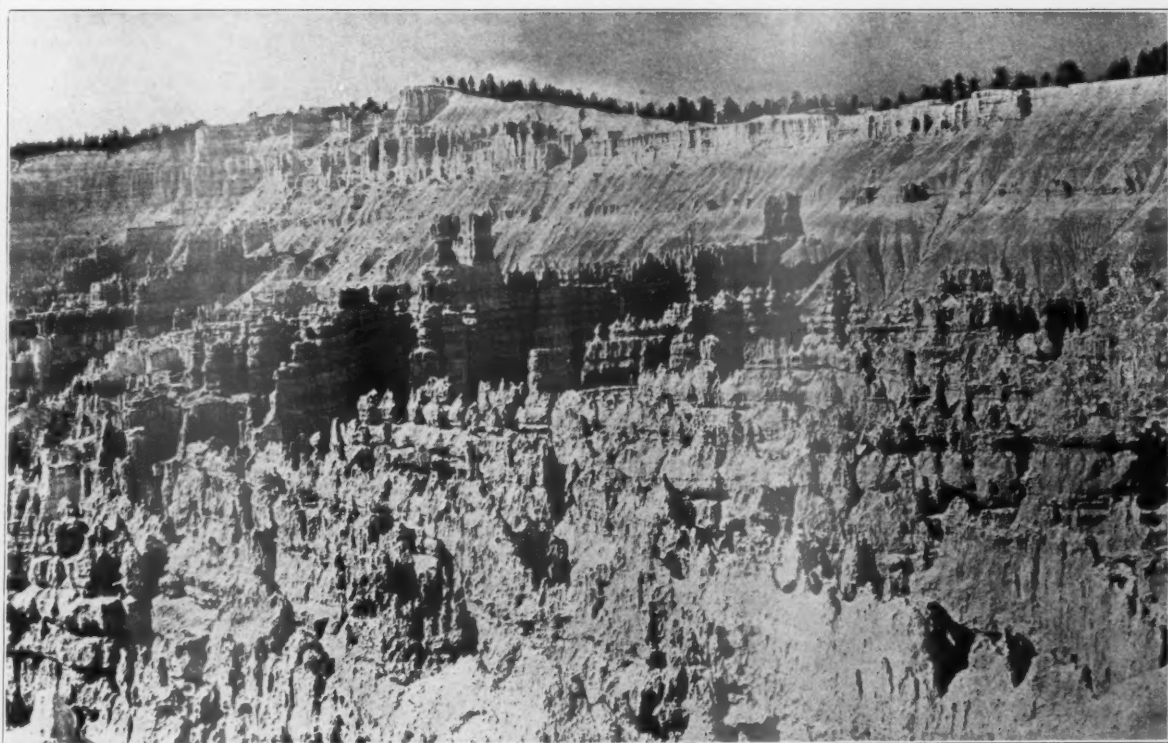
Photograph by Arthur W. Stevens.

A GORGE IN THE BOTTOM OF THE CANYON

Here is a canyon within a canyon. There are dozens of these on the Sevier National Forest in Southern Utah and each with some particular individual scenic feature.

found. Verily each of the old heathen gods would have found him a temple to his liking, no matter how unique his taste.

From the brink of the canyon, one looks down into what seems to be a city of temples. Chinese pagodas stand side by side with pure Doric columns. Bell-shaped towers of the East mingle with stately spires and countless minarets. Nature has been as lavish in her coloring



Photograph by Arthur W. Stevens.

A CLOSE VIEW OF ONE OF THE TEMPLES, SEVIER NATIONAL FOREST

One of the strangest sights to be seen in all the scenic West. The mass of rocks in this National Forest in Utah in the foreground is a series of perpendicular walls two or three hundred feet high and set ten to twenty-five feet apart. The tops are uniform in height and serrated like a rooster's comb. Their color is bright red, while that of the cliff in the background is white.



Photograph by Arthur W. Stevens.

SOME OF THE FANTASTIC ROCK FORMS, SEVIER NATIONAL FOREST

Nature was in a playful mood when she made these. A big wad of plastic material dumped down on a ledge, a smaller one on top of it, and then a third one pinched up to a peak—that is what they look like. But in reality they are the result of the inconceivably slow action of particles of sand carried by the wind. The rock throughout all this region is a sandy limestone.

as in the varied forms of the architecture. The main scheme is done in red and white, enlivened with browns and yellows and blues. The colors stand out vividly or shade into each other so imperceptibly that one is reminded of some vast fantastic city of dreams.

From the bottom of the canyon the formations take on new shapes and become grotesque images of strange beasts and men, as startling in their likeness as they differ from the creatures they resemble. It is as though some riotous imagination has carved from the colored rock all the phantasmagorical creatures of its creation and set them there for the favored visitor to see and wonder at.

And all this is in a National Forest, not a National Park, please remember, and an automobile can be driven to the very edge of the canyon. The Sevier is only one of 150 National Forests, each of which has something beautiful and unusual and worth seeing. There are many indeed which have far more of interest than the Sevier, but few people beside the members of the Forest Service known about them.

2,000,000 TREES FREE

THE Pennsylvania Department of Forestry announces that 2,000,000 forest tree seedlings will be available for free distribution in the spring of 1917. The following species make up the number: White pine, 1,250,000; Scotch pine, 410,000; Pitch pine, 200,000; Norway spruce, 75,000; European larch, 50,000; Japanese larch, 5,000; Sugar maple, 5,000; White ash, 5,000.

These are the seedlings over and above those which will be planted on State Forests. Anyone can secure an allotment of these trees if he will promise to use them for reforestation within the state of Pennsylvania. No trees will be furnished for shade or ornamental planting, nor will any shipments be made in less than five hundred lots.

RED SPIDERS INFEST TREES

By EUGENE W. MENDENHALL

THE red spider was quite bad in Ohio last summer, and this is something rather unusual for this little insect to infest trees and plants in open air, this far north, for it thrives only in dry atmosphere and can be subdued upon house plants by liberal use of water. When it occurs upon plants in the open air it can be combated with any of the washes found useful in destroying scale insects.

I found it quite bad on the Kentucky coffee-nut trees and also on the plum trees.

The Kentucky coffee-nut trees were nearly all defoliated before the trouble was known. The trees are on one of the public school grounds of Troy, Ohio. The silvery webs were spun entirely over the trees.

The very dry summer accounts for the appearance of these spiders in open air in Ohio.

THE College of Agriculture of the University of California announces a correspondence study course on "Lumber and Its Uses." This course is prepared by Professor M. B. Pratt of the Division of Forestry.

A LARGE SASSAFRAS TREE

By BERTHA M. TOMLINSON

IN a quaint old graveyard, directly opposite to the Friends' Meeting House at Horsham, Pennsylvania, stands a noble sassafras tree, estimated to be 360 years old, whose age and unusual dimensions have made it an object of interest for many years. It stands as a monu-



SASSAFRAS AT HORSHAM, PENNSYLVANIA

This tree, about 360 years old, is now nineteen feet in circumference at the ground and sixteen feet at a point breast high. Pioneer settlers of Pennsylvania are buried under it.

ment to the pioneer settlers of Pennsylvania who were buried here as early as 1719.

The first measurements, of which record can be obtained, were taken in 1852. At that time it was 13 feet in circumference at 16 inches from the ground, carrying with little diminution the same dimension on the trunk for 10 or 12 feet, where it divides into two huge branches. At present it measures 19 feet in circumference at the ground and 16 feet at about 5 feet from the ground. These dimensions are enormous when compared with the average Northern sassafras, which is seldom more than a foot in diameter. The Horsham tree is now on the decline, the trunk being hollow, but it is believed to be the record sassafras tree in the United States. During the past winter the top was broken off by the severe storms, so that but 19 feet of the main trunk is left standing. Before its decline, the tree was estimated to be over 100 feet tall. Some 20 years ago another sassafras equally as large as this stood about half a mile distant.

BRINGING BACK THE GAME

By A. A. ALLEN

A Department for the instruction and information of members of the American Forestry Association and others regarding birds and the conservation of bird life

THERE is, in this country today, a widespread awakening to the value and the necessity of conserving our native game. Law-makers, sportsmen, and the people at large, have come at last to the realization that America, at one time the richest game-producing land in the world, has been wantonly devastated. In previous pages of the Bird Department we have traced the development of game laws, culminating in the Federal Migratory Bird Law, and the treaty with Canada. We know that open seasons have been shortened, "bag limits" curtailed, and most potent of all, the sale of game ruled out in numerous states.

Laws in themselves, however, are not sufficient. There must be an organization of public opinion before they will be respected and obeyed. Organizers have not been wanting. The need for protective associations has been met by such men as Dutcher and Pearson, who founded and perfected the National Association of Audubon Societies, Burnham and Quarles, of the American Game Protective Association, Dr. Wm. T. Hornaday, and the scores of leaders of local sportsmen's organizations and bird clubs throughout the country. Through the efforts of these men, there are, today, over 500,000 affiliated sportsmen, and over a million

affiliated bird students and conservationists working for bird and game preservation.

But even though the best laws are respected and enforced by an enlightened public, the natural increase of game cannot meet the demands of the five million owners of shot-guns. The game must be given a chance to get on its feet before it is knocked down, and unless it is well established it cannot hold its own against such odds. There are three practical methods of accomplishing this end. The first is to proclaim a long closed season for several years upon any species which is apparently losing ground until it can

regain its hold. Thus, the Federal Law provides a continuous closed season for a term of years for the wood duck, cranes and the smaller species of shore birds. The second method is the establishment of refuges where no hunting at any time is allowed. When these refuges have restocked themselves, the excess game spreads to the surrounding country where it may be hunted, but the parent stock, the nucleus, the germ, is never destroyed but goes on producing, multiplying, and restocking the surrounding country. Colonel Roosevelt, during his administration, was particularly active in establishing Federal bird and game reservations, and



Photo by Courtesy of the American Game Protective Association.

A PEN OF RING-NECKED PHEASANTS

The pheasant has been reared in captivity more successfully than any other game bird and, while not a native of the New World, it is now the commonest upland game bird in many parts of the country.



Photo by Courtesy of the American Game Protective Association.

YOUNG RING-NECKED PHEASANTS

These birds are in the rearing field of the American Game Protective Association. Questions concerning the rearing of game birds addressed to this association, 233 Broadway, New York, will be cheerfully answered.

numerous states have since followed his excellent example for the same purpose. But there are far too few of these havens to have much general effect upon the game of the country. Every township should have its bird and game refuge or what is very well termed a "community sanctuary."

Several adjoining farms including more or less waste land should be selected, if possible covering from 1000 to 5000 acres, having suitable cover and food-bearing plants.



Photo by Courtesy of the American Game Protective Association.

SOME HAND-REARED RUFFED GROUSE

These are on the farm of the American Game Protective Association. Although extremely wild when hunted, the ruffed grouse in captivity shows a very friendly, confiding nature. The breeding of grouse in captivity is still in the experimental stage.

This land should be posted and no shooting whatsoever should be allowed within its boundaries. Local gun clubs and bird clubs should endeavor to increase the available food supply by planting shrubs or even strips of grain, and should make consistent efforts toward trapping the vermin which will naturally be attracted to such spots by the increase of the game and other birds. Great horned owls, Cooper's, sharp-shinned, and gos-hawks, weasels, minks, skunks and foxes, while having their place in a "wild life sanctuary" are incompatible with a "game refuge." The stray cat is everywhere a menace.

It may seem strange to ally gun clubs and bird clubs, giving them a common purpose, when their interests are superficially so at variance with each other. But the sanctuary fulfils the ambitions of both, so they can well work side by side. The bird club will be repaid by the increase of all species of birds and the gun club by the fact that while the available hunting area will be restricted, the sanctuary will act as a great game reservoir and irrigate all the surrounding country. It is far better sport

to hunt a limited country where game is plentiful than twice the area where it is scarce.

The sanctuary, moreover, has proved a more practical method of increasing most game than long closed seasons, because the closed season takes the reputable sportsman, who is, at the same time, more or less of a policeman, from the field, and gives the poacher full sway. Where the closed season alone has been tried out, it has been found that even after five-year periods the species protected has not increased materially, because of the work of unprincipled gunners and the difficulty of detecting them. As long as any shooting is allowed in an area, the protected species will go down with the unprotected because there is such a spirit of competition among hunters. "If I don't shoot it, the other fellow will," is reasoning to which even the best, at times, descend.

The question then arises, would it be better to prohibit all hunting for a term of years until every species could recuperate? Illegitimate shooting could then be more easily detected and more efficient protection be brought about. On the contrary, it has been found the least efficient method. First, the funds for warden service, derived at present from hunting licenses, and the



Photo by Courtesy of the American Game Protective Association.

SOME HAND-REARED MALLARD DUCKS

These ducks, on the farm of W. S. McCrea are returning to the home pond. The mallard is very easy to raise and is very prolific.

thousands of dollars which are annually contributed to game protection by the gun and ammunition companies, would be removed. Secondly, the interest of reputable sportsmen would be directed into other channels: they would not be in the field and protection would be entirely in the hands of a few wardens who would be utterly unable to cope with the large number of poachers and law-breakers who would result from the prohibiting of all hunting. Thirdly, the various species of rabbits would multiply so rapidly, and with them the predaceous hawks and owls, that great damage would be done, for it would

be impossible to allow the shooting of rabbits and hope to protect any other game.

After good laws have been passed and enforced, and the community sanctuary made a potent factor in game protection, there remains still another means of bringing back the game its artificial propagation. The reproductive capacity of game birds is far ahead of what is necessary to perpetuate the species, or even to provide for a normal increase. The bob-white, for example, lays from 10 to 17 eggs in a clutch, although, in order to perpetuate the species, it is necessary to raise to maturity only two young during the entire life of the pair. The additional eggs are nature's provision against calamity, and normally, just balance or offset the number of enemies to which the species is subject. Large as the clutch seems, it by no means represents the full capacity of the bob-white, for if the first nest is destroyed, another will be built and another clutch of eggs laid. Domestic fowls have been known to lay 314 eggs in 365 days through artificial stimulation by an abundant and continuous food supply and removal of the eggs as soon as laid. Game birds have never approached this record but the bob-white, in captivity,



Photo by J. T. Lloyd.

A WILD MALLARD NESTING IN CAPTIVITY

The egg-laying capacity and the comparative hardness of the mallard make it a favorite with amateur game breeders.

regularly lays thirty to forty eggs and the pheasant fifty to a hundred. Is it not to be expected, then, in this age of science, that man should take advantage of this, as he has all the other resources of nature, and in return for proper care of the eggs and young, and protection from the natural dangers and enemies, reap the benefits of this great reproductive ability. This is the secret of rearing game in captivity and the reason why it brings such great returns compared with mere protection of the birds in the natural state. The first eggs can be taken and placed under a hen and the bird will still produce more than she would in the wild state, and the output is thereby doubled or tripled.

Game breeding in this country is still in its infancy but we are at the beginning of an era of great activity. The greatest strides have been made with those species that already have been bred in Europe for centuries, namely, the mallard duck and the ring-necked pheasant, and during the past few years, much has been learned about breeding the bob-white. Successful experiments are being carried on also with the wild turkey, the ruffed



Photo by J. Heywood.

WATERFOWL POND ON A GAME FARM

These waterfowl are owned by John Heywood of Gardner, Mass. Our native Canada goose does well and breeds freely in captivity. White-fronted, Egyptian and blue geese are here also shown.

grouse, the California quail, and several species of native waterfowl besides the mallard including the beautiful wood duck. It is probable that before many years have passed every species of native game bird will have been raised in captivity. Think what this will mean for the game of our country.

In nature probably less than 10 per cent of the eggs of game birds develop into mature birds. By artificial cultivation as high as an 80 per cent yield has often been attained and considering that the yield of eggs can be doubled or tripled it is fair to expect twenty times the efficiency of nature under artificial propagation. How much more rapidly, then, can coverts be restocked?

The case of the ring-necked pheasant, although it is not a native game bird, speaks well for this method of bringing back the game. For years, hundreds of birds were imported and liberated in suitable coverts with the result that in only a few places did they establish themselves. Little attempt was made to breed them in captivity since it was supposed that the birds would do much better in the wild state. But the birds, when liberated, scattered so widely that when the mating instinct came they rarely found each other. The result was that up to ten years ago, the pheasant was nowhere sufficiently abundant to be a practical game bird. At about that time, however, several states established game farms, taking up the breeding of pheasants in captivity. Methods were perfected and soon

each farm was producing an annual yield that completely eclipsed all previous efforts. Today, for example, the three New York State farms raise for distribution from ten to twenty thousand young pheasants yearly and send to applicants from 200,000 to 500,000 eggs to be hatched under hens and liberated in the coverts. The effect has been marvelous and today the pheasant is the most abundant upland game bird in most parts of the state.

The reason is threefold. First, we have taken full

those males) can be shot in a season. So successful has this artificial propagation been that the annual output from the game farms and the natural increase of the birds in the coverts more than balances the annual kill and the birds continue to increase while the hunters continue to enjoy good sport.

When other birds can be raised with equal success, we



A FOSTER-MOTHER AND HER BROOD OF YOUNG WOOD DUCKS
The wood duck is the most ornamental of the American waterfowl and does very well in captivity. It has been successfully bred in an ordinary city yard.

advantage of the great reproductive capacity of the birds and have protected them against all kinds of enemies. Secondly, the birds are put into the coverts, not as adults, but either when two-thirds grown or as chicks with the hen, and have formed an attachment to the spot where released before maturing. And thirdly, proper restrictions of the shooting have been enforced. The season is opened for but four days during the fall and only three birds (and



A COLONY OF PURPLE MARTINS

These are the largest of our swallows. The many chambered house is placed on a pole seventeen feet from the ground. Birds have occupied this house for twenty years.

need have no further fear of the extermination of our game. The passenger pigeon and the Labrador duck are irrevocably gone, but the heath hen, which was following them, has been saved in time. Great hope is now entertained for the recovery of all other species, and thus the game will be brought back to our country.

THE SWALLOWS

(Family Hirundinidae)

PERHAPS no family of birds is better known or more easily recognized than the swallows. Numbering about one hundred species, they are found all over the world, thirty-five of them being American, although only nine are found in the United States and Canada. All the swallows have long pointed wings and trim bodies, which, together with their trustfulness about the abodes of man, make them the symbol of grace, and favorites with every nation.

Six species of swallows occur in eastern United States and Canada, four of which, the purple martin, and the barn, cliff and tree swallows, are primarily blue, and two, the bank, and rough-winged species, are brown. Of the blue swallows, the purple martin is the largest. The male

is entirely blue above and below, while the female is blue above with a gray breast. Martins nest in colonies in houses provided for them or in gourds raised on poles (See AMERICAN FORESTRY, March 1916). The barn swallow is considerably smaller than the purple martin, and has orange-brown underparts. It is easily recognized by its long forked tail which makes it very similar to the common swallow of Europe appearing so often in art and literature. Its familiar cup-shaped nest is built of mud and straw, lined with feathers, and attached to the rafters of the barn. The cliff swallow is often found about the same barn but it makes a gourd-shaped nest and fastens it beneath the eaves. This gives it the common name of "eave swallow" in many places, and it is easily distinguished from the barn

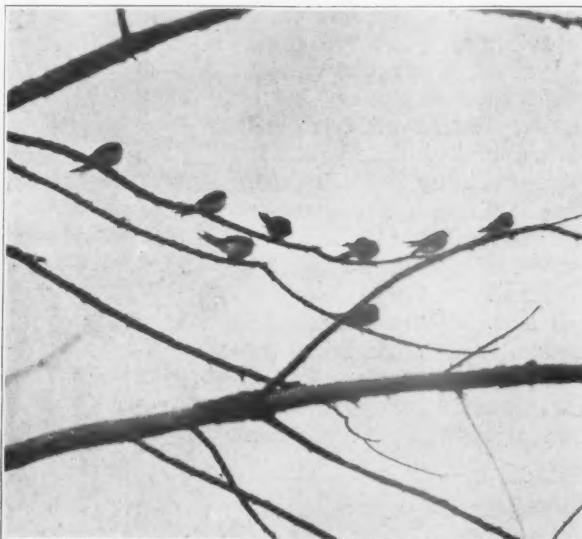
swallow by a buffy patch above its tail. The tree swallow is the fourth blue swallow and it is easily distinguished from the others by its snowy white underparts. It usually nests in an old woodpecker hole but it is easily attracted to the garden by nesting boxes placed on poles. A similar species found on the Pacific coast is the violet-green swallow.

Of the brown swallows, the bank swallow is best known, nesting in large colonies in sand banks. Each pair drills a small tunnel two to three feet deep into the sand and at the end of it builds a shallow nest of straw and feathers. The white underparts of the bank swallow are crossed by a dark band on the forebreast. The rough-winged swallow is perhaps less familiar to us, nesting as it does away from human habitations, in cliffs or creek banks, or occasionally in the deserted burrows of kingfishers.

All swallows are highly beneficial birds, feeding almost entirely upon obnoxious insects, and while the nests of the barn swallow are occasionally objectionable because of the litter of the young birds, anyone who does not encourage them to nest in his barn shows a most foolish and near-sighted policy. The modern barns with closed wagon sheds and small holes for

ventilation offer little encouragement to barn swallows. This has caused them to decrease in many places or even to revert to their original habit of nesting on the cliffs. A colony of purple martins or a few families of the other swallows will do much toward protecting an orchard from various insect

pests or freeing a neighborhood of mosquitoes, and no better investment can be made than a few hours spent in building a martin house or a few homes for tree swallows. Directions for building these houses will be found in the March number of *AMERICAN FORESTRY* for 1916. Encouragement can be given to the barn swallows by enlarging the ventilation holes, or letting the loft door stand open, and nailing cleats or driving a few nails in the rafters in suitable places. Cliff swallows, which do not like painted barns, will often accept one if a narrow strip is nailed against the wall a few inches below the eaves



A SMALL FLOCK OF TREE SWALLOWS

These are readily distinguished in the field by their blue backs and snowy white underparts. Bird houses for tree swallows should have but a single compartment and be placed on poles about ten feet from the ground.

to give support to their nests.

Swallows are highly migratory birds, most of them spending the winter in South America. They begin to assemble in large flocks along lake shores or marshes early in July, and by the middle of September, most of them have left for the South, to be gone until the last of April.



THE NEST AND YOUNG OF THE BARN SWALLOW

This nest is built of mud and straw and fastened to the rafter of a barn. All of the swallows are extremely beneficial birds and should be encouraged in every way.



A BANK SWALLOW NEAR ITS BURROW

Bank swallows nest in colonies making tunnels into sand banks and building crude nests at the end of the tunnels.

FAMOUS LATIMER ELM DESTROYED

AT the ditch over against Balliol College" Hugh Latimer, of England, was burned at the stake 361 years ago, according to the books of reference which tell the facts in connection with the martyr's death in terse terms, and what a story the old elm, under which he preached, might tell could it but talk!

The tree became famous after his arrest and death, and has been known as "Latimer's Elm" all these years. It was shattered in a recent storm in Hadley Wood, England. Latimer who rose from priest to Bishop of Worcester, was in and out of favor at court and finally lost his life at the stake in the whirling maelstrom following the Reformation in which Cromwell upset England.

Latimer was born about 1485 at Thurcaston and was graduated B. A. at Cambridge in 1510. He gained the favor of Cromwell and obtained the benefice of West Kington. In January 1532 he was cited to appear before the Bishop of London on a charge of heresy. It was then



Copyright, Topical Press Agency.

This tree, known as "Latimer's Elm," was shattered during a recent storm in Hadley Wood, England. It was under this tree the martyr, Hugh Latimer, was preaching when he received his death warrant. The photograph also shows all that remains of the old landmark.

his following became tremendous, for human nature it would seem was much the same then as now and the public fancy turned to one who was being persecuted. Latimer recanted in April and as a reward he was made a royal chaplain in 1534 and Bishop of Worcester in the following year.

Things ran smoothly for him for four years when he resigned, according to information given out by the crown, on account of his opposition to the Act of

Six Articles, but Latimer insisted it was at the request of the king.

During the reign of Edward VI, Latimer regained his favor at court and identified himself more closely with the Reformation. This proved his undoing, and with the accession of Mary he was arrested and sent to the Tower. This was in March, 1553, and on October 16, 1555, he was burned at the stake.

PORTO RICO consumes three times as much wood annually as the forests of the island produce, declares Louis S. Murphy, of the Government Forest Service, in a bulletin on the insular forests. He says in a commercial sense, from the logging stand-point the forests of the island are insignificant, and are being constantly depleted by the burning of charcoal, the native fuel.

SO popular was the farm bulletin of National Lumber Manufacturers' Association on the preservative treatment of farm timbers, that it has been necessary to issue a second edition, which points out that decay timber is a disease, caused by infection, and preventable by proper use of creosote.

THE pork packers who boast that they use all of the pig but the squeal have close rivals in several of Pennsylvania's State Forests, where the foresters are using all of the tree but the roots and leaves. This close utilization is practiced in the distillation of birch oil, an old Pennsylvania industry which has been revived "on account of the war."

NORTH CAROLINA has started a campaign to educate school children in forest work and methods, by holding annual contests among the schools. The competition is for exhibits of leaves, fruits, flowers, seed and wood of native trees and shrubs.

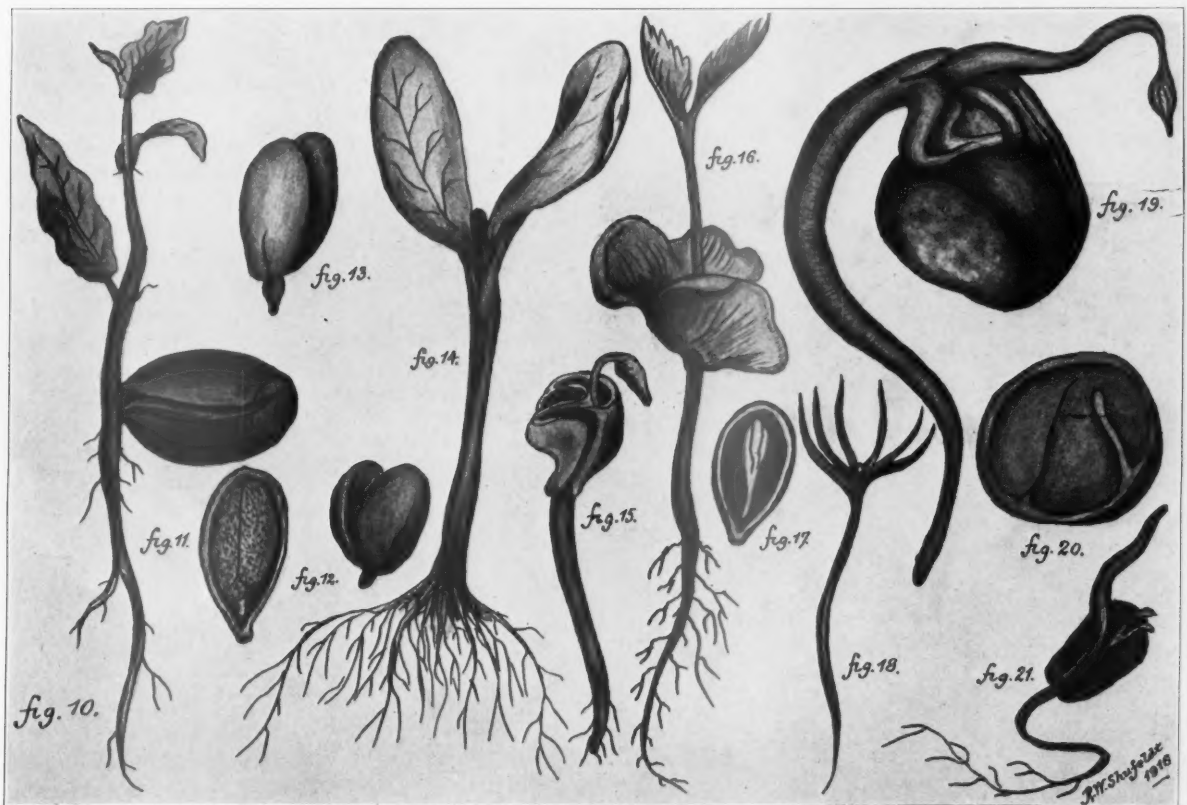
THE AMERICAN MILKWEEDS

By DR. R. W. SHUFELDT, C. M. Z. S., EDITOR OF THE DEPARTMENT OF WILD FLOWERS

THROUGHOUT the greater part of the northeastern region of the United States, there are, during the month of January, practically no flowering plants to be found in the woods or in the fields. This is especially true should the winter happen to be a particularly severe one, with little or no snow. However, south of New Jersey, and southward to northern Virginia, it has happened that, during very mild weather, some flowers, as the dandelion for example, have bloomed from late autumn until spring came round once more. The District of Columbia, for

instance, has experienced a number of such winters within the recollection of those who came into the world during the middle of the last century or earlier.

As one tramps over the snow-covered fields, or through the silent forests, where the glistening mantle of snow overlies to a large extent everything that pertains to nature and to earth, flowers are almost the very last things that come into one's head. Still, out in the open, one may meet with things that bring to memory the beauty of the spring, and summer, and fall months that made up the year which



DESCRIPTIONS OF GROWING SEEDS

Figure 10, an oak seed or acorn, with the young oak fairly started. Note that the former is split open, and that the latter consists of the *ascending axis*, bearing the first leaves, and shooting upwards into the light and air; while below the seed the *descending axis*, with its rootlets, grows downwards into the ground or soil for nourishment and support,—that is, supporting the plant in its position. Roots, as we shall see later on, are of many kinds; but in no case are they ever jointed, nor do they ever bear leaves. However they may branch, they grow for the most part downwards by extension of their free extremities or ends. On the other hand, the *stem* or *ascending axis* grows by a series of joints, which appear in succession, each supporting on its summit from one to a number of leaves. What we see in the young plant is essentially what we see in the full-grown tree, shrub, or plant, only in more marked abundance. In the case of the plants, flowers and other structures are added later on.

In Figure 11 we have a lengthwise section of an apple seed, which exposes the pair of thick *cotyledons* within; and in Figure 12 we have the appearance of the latter after they are taken out. I have separated these a little in order to show their form. In these thick *cotyledons* or embryonic leaves—or seed-leaves as they may be called—is stored the rich food that gives the plantlet its start. The same is seen in a bean (Figure 13) and in an infinite number of other plant-growths. Figure 14 shows a pumpkin seed after it gets a hold upon the ground by its rootlets. Its pair of cotyledons are still giving it nourishment, turning green prior to dispensing their stored food and becoming a pair of true leaves. Last month, in Figures 7 and 8, there was shown the nut of the beech tree, both whole and bisected; and here we have, in Figures 15 and 16, the young,

growing beech tree. As we know, this nut is sweet and delicious, and so rich is it in nourishment that it gives the young beech tree a tremendous start, the earliest stages of which are shown in Figure 15. In Figure 16 these are expanded, and the first joint of the plantlet bears its first pair of leaflets aloft.

One of the best ways to study this most interesting and instructive part of our subject, is to get a box of convenient size and fill it with good soil, which should be kept moist and in a warm place. In this should be planted seeds of a variety of plants and trees, as those of the lemon, corn (Figure 21), pea, bean, horse-chestnut (Figures 19 and 20), pine tree (Figures 17 and 18), rice, canary seed, and so on. As germination takes place and proceeds, carefully compare the form it takes on in the different species and seeds; you will find that the cotyledons, figured and defined last month, vary enormously in the matter of form and development. Where there are but two cotyledons, the plant belongs to the *dicotyledonous* group; but when you observe your onion seed, or your grain of corn as it starts to grow, you will note that such forms send up but a *single leaf*; they are therefore called *monocotyledonous*. In the case of the pines and the like, there may be from three to five or even ten cotyledons, and when this is the case we term them *polycotyledonous*. These words are very simple when we know what a *cotyledon* is; the prefixes *di*, *mono*, and *poly* mean but one, two, and many, as they do in so many other words in our language.

In Figure 17 we have a bisected pine seed, showing the embryo, while the *polycotyledonous* young pine tree is shown in Figure 18. In some later issue next year I shall devote a few paragraphs to completing what there is to be said in regard to the germinating seed, the growing plantlet, and their various parts.

closed with the last day of December. Standing well up above the carpet of snow, one may see a score or more of the curious and artistic-looking remains of the card teasels. These have already been illustrated and described in a former article in this Department; but not so the scattered band near them of the very interesting seed pods of last year's milkweeds. These appear to be of two or three different kinds, as their varying sizes and appearances would indicate. For the most part they are either of a pale gray, or of an equally pale tan color, and the pods are borne upon tall, rather stout stalks, in groups ranging from one or two to five or six, or maybe more. Almost without exception they are all split open lengthwise, and their winged seeds have, weeks ago, been distributed far and wide, by the wind or other agencies, over the country, in order that other colonies of these remarkable growths may be started next summer.

But these pointed, big and little, empty pods, borne by their dried stalks well above the glistening January snow—out there—by no means constitute all there is to be said and learned about our milkweeds. In the first place, these plants have been given a distinct family in the vegetable world, and to it has been relegated some six other minor groups or genera.

Now, as long ago as the fifth of June, 1656, there was born at Aix, France, a boy who, in the years that followed,

came to be one of the world's great botanists. His name was Joseph Pitton de Tournefort, and he died at the early age of fifty-two. In his short span of life, however, he described many beautiful flowers, and became professor of botany at the Royal Garden of Plants at Paris. Tournefort studied, perhaps, only the milkweeds of Europe; and, in cudgeling his brain for a name for the group or genus to contain them, he somehow hit upon *Asclepias*, having it in mind, for some reason or other, to commemorate the name

of Æsculapius or Asclepios, the god of medicine of Greek mythology. However this may be, our own famous as well as favorite botanist, Dr. Asa Gray, retained this name, and arrayed all of our different species of milkweeds in his *Asclepiodora*, which accounts for the name of the whole milkweed family—the *Asclepiadaceæ*. Upwards of two thousand species and varieties of these have been described for the world's flora, and probably many another is still unknown to science. Ambitious young students of wild flowers may remember this fact; and when exploring in foreign and little known lands, they should not forget to gather specimens of this most interesting and famous assemblage of plants. They call them "weeds" in many places; but somehow I never think of any plant as a weed, the more so as the Century Dictionary defines a weed as "Any of those herbaceous plants which are useless and without special beauty, or especially



OUR MOST ABUNDANT MILKWEED

FIG. 1.—Here we have the beautiful flowers of the Common Milkweed or Silkweed (*Asclepias syriaca*), and also a head of buds belonging to another plant. Both are of natural size, and reproduced from one of the author's photographs of specimens collected in the District of Columbia, in the summer of 1916. In this common and very elegant species, the stem is tall and stout, frequently supporting the finest kind of vegetable hair, which may here be seen with a hand-lens. In other words, the stem is finely pubescent. Note the large and broad leaves which are short-petioled,—that is, the "foot-stalk" of the leaf is short. Distally, some of these leaves are pointed and rather narrow; others are blunt, and all the wavy margins are entire. They are downy on their under-sides. Turning to the flowers, we find them typical of this family, and of a very complex structure (morphology). In color they are cream white, while specimens may be met with in which the flowers are a dull purple, the purple in other specimens shading off into white. This one of our American milkweeds is very prone to furnish hybrids with those species nearest related to it. A study of these hybrids is an interesting field for investigation.

which are positively troublesome." I take the æsthetic side of this question, and I am free to say that all plants, and all flowers, are beautiful to me and worthy of study, however the agriculturist may regard them.

There are some nineteen species of milkweeds in the United States, not counting the Green Milkweeds (*Acerates*), of which there appear to be four species recognized. These latter have greenish flowers and other features distinguishing them; but at this writing they must be set aside, to be described at some future time. This applies also to the plants called "Angle-Pods," three genera of which contain, when taken together, some ten species that are also grouped in the milkweed family.

It is not always an easy matter to correctly identify the American milkweeds, for in their characters some of them are found to be quite near their closest relatives in the family. Such specimens as I have collected and photographed to illustrate the present article have very kindly been verified for me by Mr. P. L. Ricker, of the Division of Plant Industry, of the U. S. Department of Agriculture at Washington.

The buds and flowers of the Common Milkweed, or Silkweed, as it is sometimes called, are well shown here in Figure 1. Structurally, they are very complex,—indeed to such an extent as to render popular description quite out of the

question. This species is now known as *Asclepias syriaca*, though formerly it was called *Asclepias cornuti*. Mathews, in his "Field Book of Wild Flowers," says it is "the commonest of all the *Asclepias*, and remarkable for its cloyingly sweet, somewhat pendulous flower-cluster, which is most æsthetic in color; it varies from pale brownish lilac to pale lavender-brown, and from dull crimson-pink and pink-lilac to yellowish (the horns particularly)

and brownish lavender" (p. 368). As in a good many other species of these plants, the juice is milky white in appearance, being somewhat sticky when handled.

Perhaps one of the most interesting species of all this milkweed group is the one known as the butterfly-weed—for other reasons called the Pleurisy-root. Linnaeus named this *Asclepias tuberosa*, and in Figure 5, I show a reproduction of one of my photographs of its very dainty little seed-pods. These give us no conception of the beauty of the flowers which their stalks supported during the midsummer days of last year. One thing about this species is, that, contrary to rule, its juice is not milky, although the plant is a true milkweed. It is generally found growing in old fields, or in dry, worn-out pastures; and as it often comes to be a yard or more high, we can frequently recognize its gorgeous flowers of a rich, glowing orange at a very considerable distance. Some-



THE ROUGHISH PODS OF THE COMMON MILKWEED

FIG. 2.—This illustration presents three pods of the Common Milkweed—one in full view, one crossed by a leaf, and one almost out of sight. They are of a brilliant green color, of a medium shade, and covered by a growth of longish, soft, spinous processes, of the same color as the pod. These processes disappear as the pod ripens; and but two of the pods are ever found on the same stem, consequently two plants are here shown—one behind the other. Were we to open one of these pods, we would find the immature seeds beautifully as well as systematically arranged in a curved plane, with their silk firmly adpressed against them. Note how the stem of the upper pod is bent downwards, so as to be parallel to the stem of the plant. This picture also gives an excellent idea of the leaves of the Common Milkweed of the normal type—that is, not affected in any way by hybridization.

times a single stalk will bear upwards of twenty of these rich flower-clusters. Then, too, it is not long before we appreciate why it was called the butterfly-weed, for its long, small, orange and yellow flowers seem to actually fascinate a number of our prettiest midsummer butterflies. In fact, one exquisite species of butterfly, particularly given to resorting to these flowers, is the Milkweed Butterfly (*Anosia plexippus*)—a very common, but none the less beautiful insect, possessed of a most extraordinary history, as anyone may discover by reading the account of its life history, given us by our most distinguished writer on the subject, Dr. Wm. J. Holland, in his elegant volume, "The Butterfly Book."

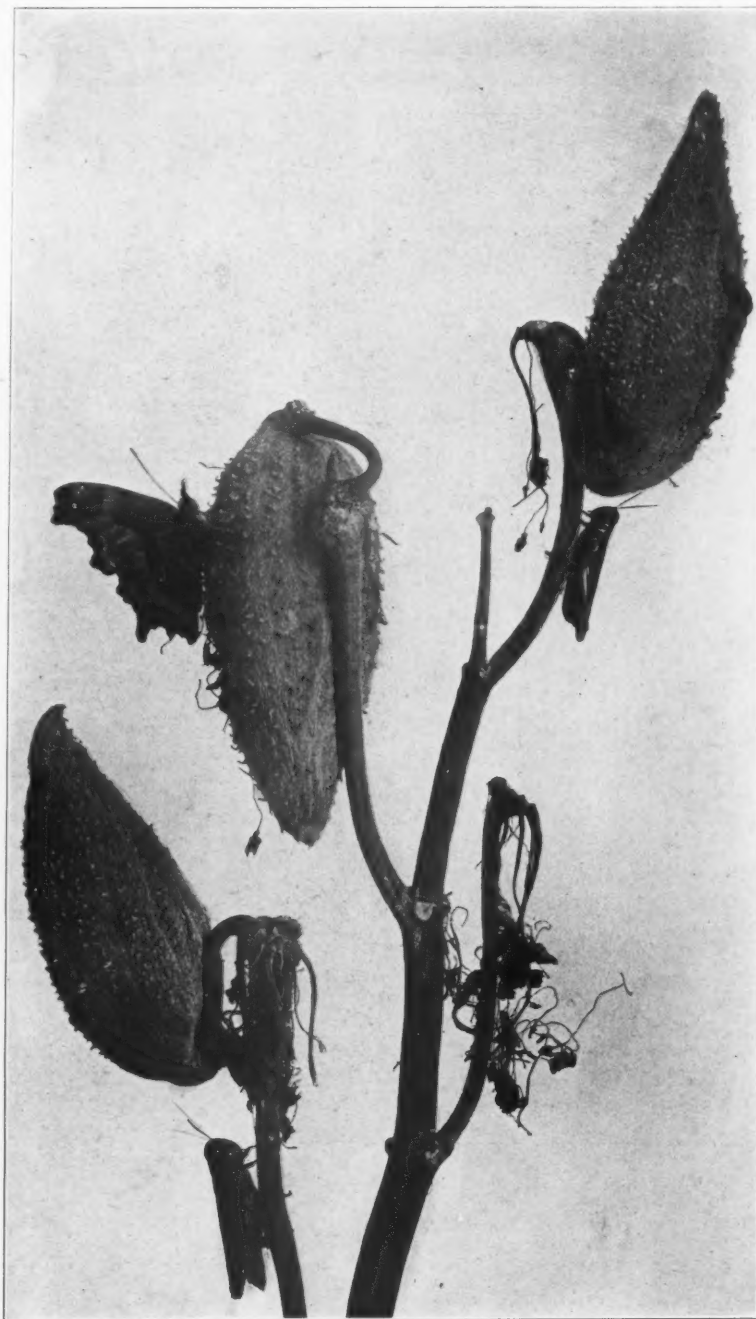
Neltje Blanchan, in her very useful work, "Nature's Garden," gives one instance where nearly twenty different species of our most beautifully colored butterflies were attracted at one time to a mass of these milkweeds, all in full flower and growing in one place, on a "mid-summer day along a Long Island roadside."

There is much to be seen in Figure 5 of the present article, and much that sheds light upon the milkweeds as a group of plants. We must note how very slender, elongate, and spindle-shaped these pods are in

the Butterfly milkweed, very different from some of the robust ones of other species (Fig. 2). Any one of these seed-

pods is smooth and longitudinally lined on the outside, while inside, the surface is also smooth and more distinctly grooved from tip to tip. At first they are green outside, turning gradually a beautiful tawny brown as they ripen; these two colors blend in some instances. As in all American milkweeds, the very thin dark brown, flat, and roundish seeds are each attached to a silky and feathery affair, which, when the seed quits the pod after it is fully matured or developed, bears it away on the breeze to a different locality, and to a vast number of very different fates. As will be observed in the illustration, these stalks of the Butterfly milkweed branch near their extremities; the terminal ends of the branches fork, and a seedpod is borne on the tip or end of each fork. Often both pods mature and are perfect; but very frequently one of them will abort and the seeds amount to nothing. This is almost the rule in our Common Milkweed (*Asclepias syriaca*).

The entire history of the fertilization of the milkweed flowers is a thrilling, botanical romance; a whole volume of no mean proportions might be devoted to it and not then exhaust



MILKWEED PODS AS THEY APPEAR JUST BEFORE BURSTING OPEN

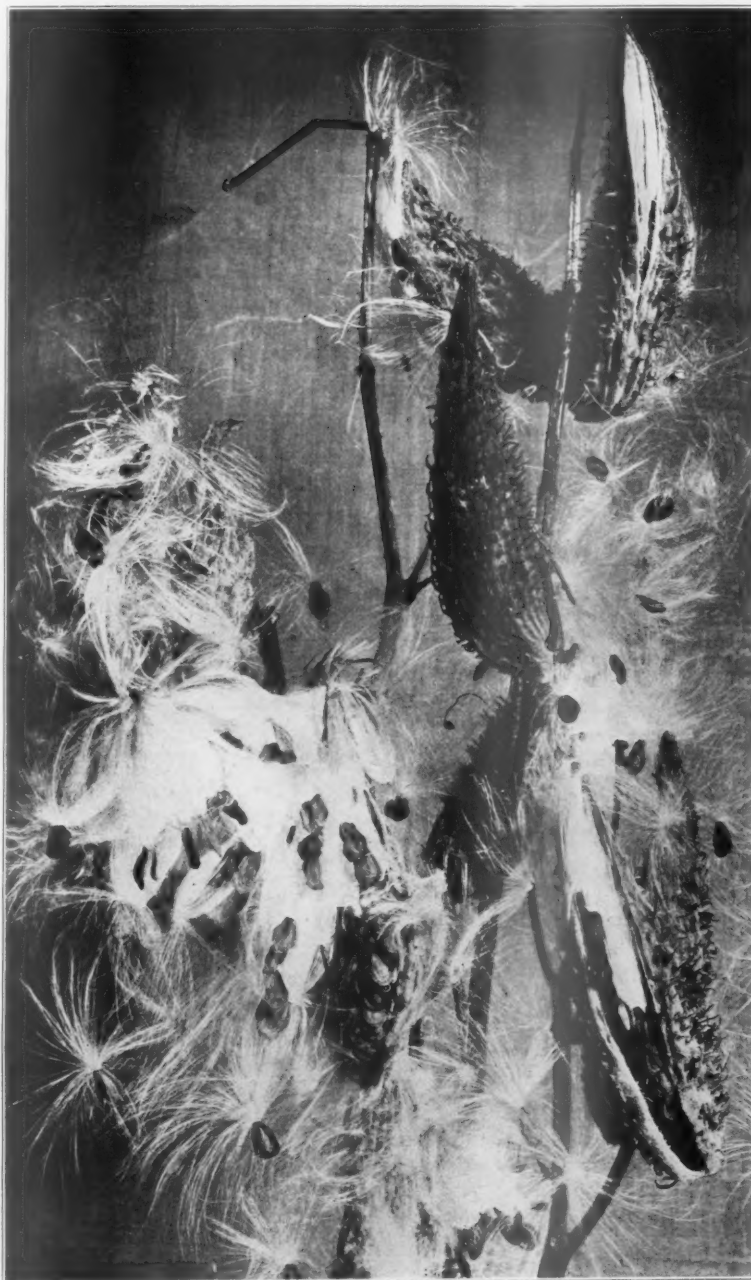
FIG. 3.—We have here a most interesting illustration of the seed-pods of the Common Milkweed (*A. syriaca*); it is reproduced from the author's own photograph of a specimen obtained in Maryland, in the fall or late summer of 1916. It will be observed that the leaves of the plant have all fallen off, and that the soft, spinous coat of the exterior of these pods has likewise nearly all disappeared. Note how these pods point upwards as well as downwards, and that in every instance the twin pod has aborted and fallen off from the stem. The stem, or peduncle, has also shrivelled up, and may still have clinging to it some of the fibres of the outer coat of the seed-pod. These structures are now a pale tan color; their seeds are rapidly ripening inside, and very soon these pods, had they not been collected, would have split open, allowing the silky-winged seeds to escape and to float away to start other colonies of the plant, in other regions far and near. At this stage the juices of the stem of the plant have all dried up; it is light and brittle, the color being nearly the same as the pods. On the middle pod is a beautiful, living specimen of the butterfly known as *Grapta progné*, very nearly natural size. Dr. W. J. Holland states in his "Butterfly Book" that this species occurs only as far south as Pennsylvania, while I captured this specimen in the District of Columbia (summer of 1916). In the work cited it is Figures 3 and 4, of Plate xx. The two grasshoppers are of the common species found in the same section.

the subject. Neltje Blanchan gives us something about this very butterfly milkweed in the following words which require no apology for quoting: "Surely here is a butterfly flower if ever there was one, and such are rare. Very few are adapted to tongues so long and slender that the bumble-bee cannot help himself to their nectar; but one, almost never sees him about the butterfly weed. While other bees, a few wasps, and even the ruby-throated hummingbird, which ever delights in flowers with a suspicion of red about them, sometimes visit these bright clusters, it is to the ever-present butterfly that their marvelous structure is manifestly adapted. Only visitors long of limb can easily remove the pollinia, which are usually found dangling from the hairs of their legs. We may be sure, after generously feeding its guests, the flower does not allow many to depart without rendering an equivalent service. The method of compelling visitors to withdraw pollen-masses from one blossom and deposit them in another — an amazing process — has been already described under the common milkweed. Lacking the quantity of sticky, milky juice which protects the plant from crawling pilferers, the butterfly-weed suffers outrageous robberies from black ants. The hairs on its stem,

not sufficient to form a stockade against them, serve only as a screen to reflect light lest too much may penetrate to the interior juices. We learned in studying the prickly pear cactus, how necessary it is for plants living in dry soil to guard against the escape of their precious moisture" (*loc. cit.* p. 327).

The lance-headed leaves of this species of milkweed are of a lovely tawny green, and spring alternately from the stem of the plant.

Sometimes—indeed quite frequently—the stalklets that directly bear the seed-pods in many milkweeds are peculiar in one respect: they are bent or curved like the capital letter S, and sometimes so twisted that the apex of the seed-pod actually points downward to the ground; this feature is well shown in some of my figures illustrating this article, particularly in Figures 3 and 5. Even the flowers themselves turn back toward the main stem in some of the milkweeds. Next summer you will have no trouble in finding the species wherein this feature is well pronounced, for the common poke milkweed exemplifies it beautifully (*Asclepias phytolaccoides*). If in the meantime you would like to see a good cut of one of this kind, you will find it in the "Wild Flowers of the Northeastern States," by Ellen Miller and Margaret



MILKWEED PODS GIVING THEIR WINGED SEEDS TO THE WIND FOR DISTRIBUTION

FIG. 4.—These bursting seed-pods of the Common Milkweed (*A. syriaca*) is one of the most beautiful sights in the plant world. This photograph was made by the author in the late summer of 1916, and satisfactorily illustrates the process or phenomenon. It shows the pods in all stages of opening, the seeds exemplifying every phase of their escape and preliminaries to migration. These pods are still roughish, and of a pale, stone-gray color. They are hard, dry, and tough, but not brittle, while the stems or stalks are easily broken. The flat, thin seeds are of a rich brown or deep tan color, and very easily detached in any case from their silky appendage. In form, they are *ovate*, with the apex attached to the silk, while the seed proper is convex on one surface, and correspondingly concave on the other, the thin part being the sharp surrounding margin. Neltje Blanchan says: "Like the dandelion, thistle, and other triumphant strugglers for survival, the milkweed sends its offspring adrift on the winds to found fresh colonies afar. Children delight in making pompons for their hats by removing the silky seed-tufts from the pods before they burst, and winding them, one by one, on slender stems with fine thread. Hung in the sunshine, how charmingly fluffy and soft they dry!" (*loc. cit.*, p. 138.)

C. Whitney—a very good book to have on your botanical bookshelf. When you come across this species, either in an illustration or in the field—it is usually found in July, growing on a shady bank or in moist places elsewhere—note its big, oval leaves, sharp-pointed at both ends. Sometimes these leaves are half a foot long by three inches in width, their margins being smooth in outline, and not indented or notched in any manner whatever. The strong mid-rib is always conspicuously developed, the leaf itself being a beautiful clear green color above and lighter beneath. If you handle one, you will find it is soft to the touch and fine in texture. Occasionally you will find the mid-rib pinkish above, and this is sometimes the case with other plants of this group. But we must particularly study the way in which the leaves spring from the main stem. Here in this poke milkweed, they are *in pairs*, and as we go up or down the stem, we find each successive pair placed at right angles to the pair above or below it. In one handsome species of our milkweeds—the four-leaved milkweed (*A. quadrifolia*)—the leaves at the middle of the stalk or stem are arranged in a circle, while above, the leaves are smaller and narrower and arranged only in pairs. The flowers of this species are of a magenta-pink shade and very beautiful.

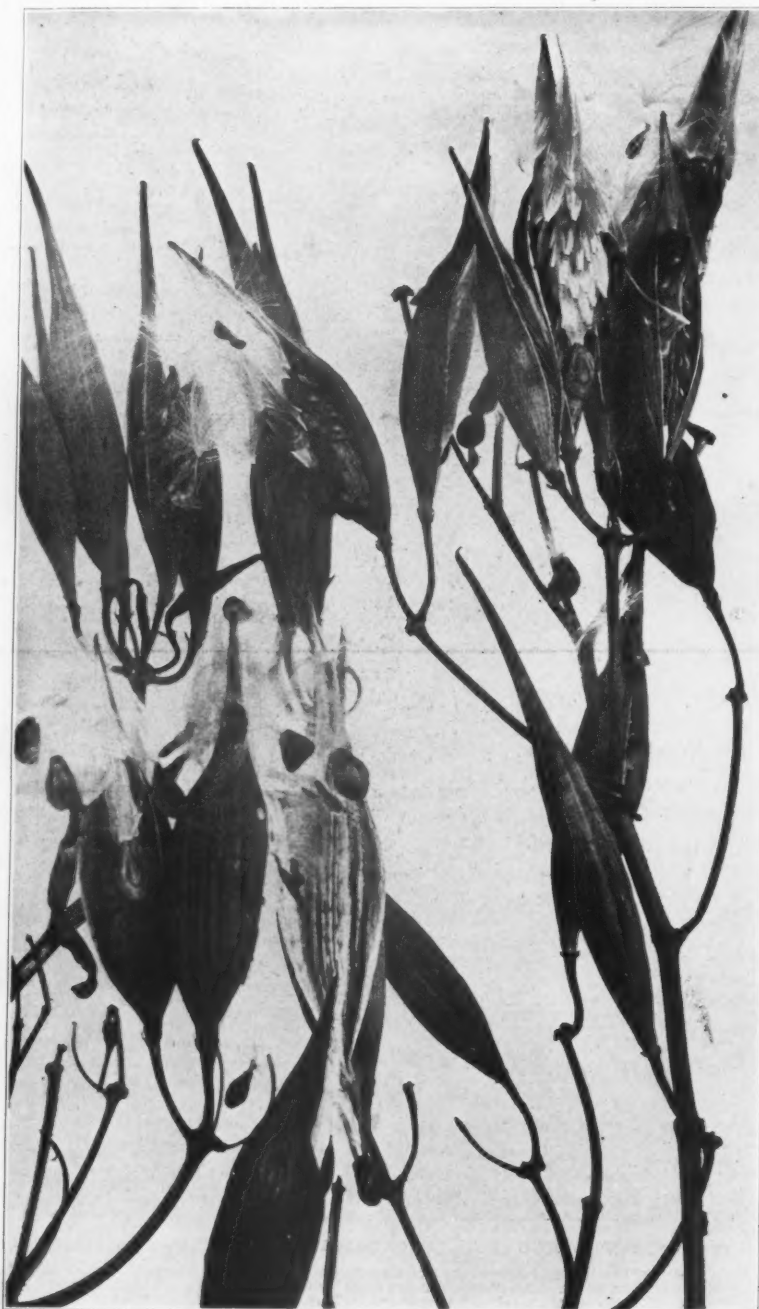
Students of this assemblage of plants have paid especial

attention to the leaves of the various species, and this is a matter of considerable importance. Leaves of the different milkweeds vary in the several particulars of size, form, and color; they are also arranged on the stems in diverse ways in the case of the several species. As a matter of fact, this variance is so great that the best way to study these variations will be to collect, next summer, as many of the milk-

weeds as possible, pressing them carefully; you will find that you have a nice lot of material to study during the long winter evenings of 1917–1918. You should have at hand a copy of the last edition of Gray's New Manual of Botany (illustrated); in it the leaves of most of our milkweeds are briefly described. When collecting these plants, be sure to take home the *entire plant*, including the root. This is important in the case of the milkweeds especially; for, from one end to the other, the leaves in many species vary in all particulars,—that is, with respect to position, number, color, form, structure, and size.

Many of the species bear scientific specific names that invite attention to the leaves, as in the case of *A. lanceolata*, wherein the leaves are sometimes almost *linear* in form, or elongolanceolate. Others are the already mentioned four-leaved milkweed (*A. quadrifolia*), the oval-leaved milkweed (*A. ovalifolia*), and so on.

Mrs. Dana, in



PODS OF THE BUTTERFLY WEED MAKING GOOD FOR ANOTHER YEAR

FIG. 5.—What was said in the legend beneath Figure 4 applies, in large part, to what we see here of the bursting seed-pods of the lovely butterfly-weed (*A. tuberosa*). In several places the exact form in the seeds is well shown here, as well as their arrangement and disposition in the interior of the pod. Observe that the latter are supported on *twin stems*, and in many instances both pods may mature and contain their usual quota of seeds. These latter are lightly attached to their silken appendages; and I am inclined to believe that some of them at least may be detached before the silk has an opportunity to escape from its prison. An example of this is seen in the open pod facing the front at the upper right hand side of the illustration. We have still much to learn along these lines, and there is beautiful material here for boys and girls to study at home, as well as under their nature instructors in the schools.

her little work on "How to Know Wild Flowers," says that the "swamp milkweed, *A. incarnata*, grows commonly in moist places. Its very leafy stems are two or three feet high, with narrowly oblong, pointed leaves. Its intense purple-pink flowers gleam from the wet meadows nearly all summer. They are smaller than those of the purple milkweed, *A. purpurascens*, which abounds in dry ground, and which may be classed among deep pink or purple flowers according to the eye of the beholder" (p. 229).

During the latter part of the summer of 1916, my wife and I found ourselves making our way through a rank, old pasture that bordered the Georgetown Canal, about a mile above the Lock Tavern Club at Great Falls, Maryland. It was an ideal day for a tramp, and many species of the early autumn flowers were in full bloom. We soon came to a part of the field where a very large number of milkweeds had flourished—principally the butterfly-weed and the common species or silk-weed (*A. syriaca*). At the time of which I write, they had nearly all gone to seed, and the sight



MILKWEED PODS OF A LONG, SLENDER VARIETY

FIG. 6.—For some reason or other, there has been a disposition on the part of the seed-pods of some milkweeds to become elongated, pointed distally, and of moderate caliber even where the girth is greatest. This is well shown in the pods here represented, which are of the blunt-leaved milkweed (*A. amplexicaulis*). These have a comparatively smooth external surface, with faint indications of longitudinal ridges. Instead of only two pods being attached to the end of the plant-stem, there are three, and all of them are in good condition. The other stem in the picture supports only two, the bases only of which are seen, and they are in perfect condition. This species has been named the blunt-leaved milkweed for the reason that the terminal apex of the leaf is bluntly rounded off, which is unusual in the leaves of this genus of plants. The insects shown on these pods are representatives of either the family *Penaiomidae* or the *Coreidae*, which contain the well-known stink-bugs and the ill-smelling, especially on the common milkweed, and that is the red milkweed beetle. He is often present in numbers to the extent of two or three dozen on the same plant. Being fully half an inch long, with the body a bright vermillion red, with four black spots on either wing and with black antennae, he is a very striking little fellow not readily overlooked. There is also another red and black beetle about the same size, with which it must not be confused. Last summer I photographed, natural size, some thirty of these on a pod of the common milkweed, and they were kindly identified for me by Dr. L. O. Howard, Chief of the Division of Entomology of the U. S. Department of Agriculture, as the pupal form of *Lygaeus luridus* Fabr. It is also found on the common milkweed in July. Attention is invited to these insects for the reason that they are so commonly found on our milkweeds that students of these plants should be familiar with them. If you study the milkweeds next summer, you will be sure to meet with the red milkweed beetle (*Tetraopes tetraophthalmus*), and with perhaps the other which is not so abundant.

was really quite a wonderful one. Scores of their dried stalks were in evidence on all sides, and hundreds of the little pods of the butterfly-weed had burst open (Fig. 5), as had many of the common species (Fig. 4). Their seeds were everywhere, borne along by the very gentle breeze that came in fitful puffs, having barely force enough to carry away those seeds that had the feeblest hold upon the pods that harbored them. Some of the pods that had just split open looked as though a brown-scaled fish had been neatly packed away in them; but this illusion was dispelled in the case of others by their being so far matured that the winged seeds were already emerging from them. The sight was truly an extraordinary one, made all the more so by the great abundance of the stalks in view, and by the presence of so many other gorgeous plants in full flower, as great masses of the little, white, wreath-aster, the New England aster, enormous specimens of poke-weed (*Phytolacca decandra*), two or three of which were over six feet in height, with great, intensely scarlet trunks and limbs, and with hundreds

of magnificent bunches of blackish berries drooping from them. Tall, rank grasses grew everywhere; extensive patches of the blue boneset (*Eupatorium caelestinum*), some golden rod and golden aster, and a whole lot of other flowers. But the milkweeds, with their masses of winged seeds gently floating upon the breeze, formed the principal attraction—simply beautiful in the blaze of the sunlight of that exquisite autumn afternoon.

These silk-tufted seeds and these tough milkweed stalks have both some commercial value. The former, mixed with flax or wool, can be woven into a fairly useful fabric, while the latter have been used by our paper manufacturers, which last might well be considered at the present time, when those interested are cudgeling their brains to find material for this purpose. The stalks of the dead cotton plant have a similar use, and there are doubtless others that can be made to furnish stuff from which paper can be made. Prodigal America should promptly turn its attention to this matter, in order to save the thousands of valuable trees that are now being sacrificed to this end.

Some of our milkweeds seem to never have received a common or vernacular name, and descriptions of them are not to be met with in the popular works on our plants and flowers. Among these we find *Asclepias amplexicaulis*, first described by the botanist James Edward Smith, though I believe it was the *A. obtusifolia* of Michaux before him. These are the species the young student should give his best attention to, and let his researches be recorded. The species just named is found in sandy places, from New England to Nebraska and southward. Other species are in the same case, and their scientific names can easily be found in Gray's Manual.

Before leaving them I would invite attention to the peculiar seed-pods of the *A. amplexicaulis* mentioned above. These are of some size and spindle-formed, and I found at least three of them springing from the upper free end of the stem of the plant which bore them; in other cases there were but two (Fig. 6).

Curiously enough, we have at least one species of milkweed in which the seed has, sometimes, no silky attachment,—that is, no coma. This is the case in *A. perennis*. Again, we must be on the look-out for hybrids among these interesting perennial herbs; not a few have already been found, and others will be by careful search in the regions where many kinds of milkweeds flourish.

No member of the milkweed family ever attempts self-fertilization, as is the case in so many other flowering plants. As a consequence, the milkweeds have thriven tremendously, and are now represented in zones and places suited to them around the entire world. Fertilization in them is performed wholly through the agency of insects, and among these are principally to be reckoned many species of butterflies, bees, flies, beetles, and wasps. Doubtless, too, during the night, moths and other insects perform a similar service. The story of the fertilization of milkweed flowers reads like a fairy-tale, and much has

been published on the subject. Professor Robertson has given especial attention to this line of research work, and it is truly marvelous what a chapter it makes in botany and natural history. In short articles like the present one, it will be quite out of the question to take the matter up, but this may be done later in another connection. Next summer, however, no more interesting study could be taken up than that of the intimate structure of a single milkweed flower, with a careful investigation of the suckers, feet, and habits of representatives of all the insects I have enumerated above. When this has been sufficiently mastered, a moderately strong hand-magnifying glass with considerable field can be used to study the flowers *in situ*, as they grow in nature, at times when the insects mentioned are visiting them. Note how the flowers have come to assume structures and forms that compel these insects to carry away the pollen from them, to fertilize the flowers of other milkweeds far and near. It is truly an extraordinary chapter in nature's ways, and by no means an unprofitable one to look well into. Try it! And if you love novelty and ways that are passing curious, I am sure you will make more than one visit to the milkweeds with your magnifying glass.

So it will be seen that the preservation and extension of milkweeds is sure of accomplishment; the flowers are not self-fertilizing, and their seeds, which are very abundant, are provided with a means ensuring widespread distribution.

All plants are not thus fortunate with respect to their conservation—indeed, few plants are—as I have clearly pointed out in AMERICAN FORESTRY in a previous issue. This inclines me to say a word here in regard to a matter recently brought to my attention. I have been given to understand that Mr. Alex. J. Negley, of Pittsburgh, Pa. (305 N. Negley Ave.), who is greatly interested in the conservation of our wild flowers, has lately been making some very important experiments in that direction. Mr. Negley has collected large quantities of the seeds of such plants as foxglove, larkspur and golden aster (*Chrysopsis*) and when down, I think he said somewhere in Florida, he threw these seeds from his motor car into likely places on both sides of the road which he traveled, with the hope that some of them would germinate and spread their kind in the new localities. This they did, more abundantly than he anticipated, and very soon the people living in those places spoke of the new flowers that were appearing in their region; others noticed them in passing over those roads in their cars. This admirable work should be extended over very much larger areas; in fact the U. S. Department of Agriculture should take hold of it, if it has not already done so, and scientifically enlarge upon the suggestion so thoughtfully put on foot by Mr. Negley. Many of our most beautiful flowers are being exterminated over wide areas, and we should most assuredly make every effort to preserve those that are harmless as well as very beautiful, in that our descendants may enjoy them as we have. This should be looked into at an early date, and steps taken to have it assume a practical form.

FAMOUS MORO ROCK

BY MARK DANIELS

MORO Rock is on the north side of the middle fork of the Kaweah River in Sequoia National Park. It towers four thousand feet above the river bed directly below it and commands a view of the Great Western Divide to the east. Why it has been named Moro Rock no one can tell, for it has none of that individuality which would suggest its name, although it is about as fittingly named as is Florence Peak.

The road from the Park headquarters in the Giant Forest swings around the edge of the plateau to a point only a few yards from the shoulder of this mountain of granite. From the road a trail leads out on to the rock and a few crude steps have been shaped so that it is possible, with about that degree of safety which our Federal Government generally provides for its tourists, to scale the point of the rock from whence the astounding views to the east and the west may be had.

To one who has sojourned for any length of time in the district, Moro Rock presents an ever-fascinating lure, for the scenes that may be beheld from its summit are never the same. At times, the great canyon of the middle fork of

the Kaweah stands out in bold and sharp relief through the crisp atmosphere. At other times a gentle mist seems to hover over its slopes and the scene takes on much of the character of the Scotch Highlands. Again, black thunder clouds will be rolling up through the canyon, and the lightning flashing over the crest of the Great Divide converts the entire gorge into a great cauldron of infernal tempests.

The headwaters of the Middle Fork of the Kaweah River enter the main canyon only a few miles above

Moro Rock, and at the junction some of the best fishing in the district is to be had. Fishermen who traverse the trail that skirts the head of the canyon invariably complain that the fifteen miles from Park headquarters to the next camping place are the longest fifteen miles they have ever traveled. From my observation, I know that the time necessary to cover the distance need never be so long as that spent by the anglers, but they invariably stop at the stream crossings to cast just once or twice in the tempting pools, which accounts for the length of time which they consume on the trail.



THE GREATEST OF MORO ROCKS

Almost every scenic area has its Moro Rock or castle, but this on the north rim of the middle fork of the Kaweah River Canyon, Sequoia National Park, California, is the daddy of them all.

FRENCH FOREST DESTRUCTION

By URBAIN GOHIER

AT all times war has destroyed men and animals, houses and temples, farms, castles, and cottages.

The present war destroys more, the forests. The peril of deforestation and the problem of reforestation, which face us continually, with no actual future results, must gain our attention at once if we wish to live and to work in the future. The agricultural situation which we are studying, and shall continue to study, is only of value when connected with the re-establishment of French forests,"

writes Urbain Gohier in a recent number of *Le Journal, Paris*. "For, if there are no more trees, there is no fertile soil, no question of cultivation, no agriculture.

"Even before the war it was the Germans who contributed most to the destruction of our forests. They had invaded their own forest kingdom and wished to spare it in the future. They had need of wood for constructing their railways; they had attacked our forests and methodically destroyed them. The Himmelsbach firm of Fribourg-en-Brisgau; the Falks of Sarrebourg; the Schmollers of Darmstadt, and

other Germans established at Nancy or at Paris, acquired wholesale all the wooded lands, not only in the East in the Vosges, Ardennes, on the Meuse, the Meurthe-et-Moselle, and Upper Marne rivers, but as far as the basin of the Loire. They did not merely exploit these forests—they razed them completely, sold the trees, parcelled out the land, or leased it for hunting. As a rule, the trees paid the purchase price and the sale of the land formed the profit. The owners of the forests succumbed to the temptation of ready cash, at first because the offers were high, later, because a forest owner maintains a seigniorial appearance of extravagance which makes him liable to public exigencies and to the animosity of legislative demagogues. Such domains pay 80 per cent of their products for taxes. The forest owner seized with alacrity the opportunity to realize on his

patrimony and to place the capital in more prudent investments. In a period of ten years two hundred thousand hectares of forest gave place to desert tracts which remained unproductive for some time.

"To this cause of destruction naturally were added other permanent causes. To the ravages of flocks of goats and sheep were added the depredations of mountain dwellers, devastations which should have been punished by law, which the administration tried to reach but

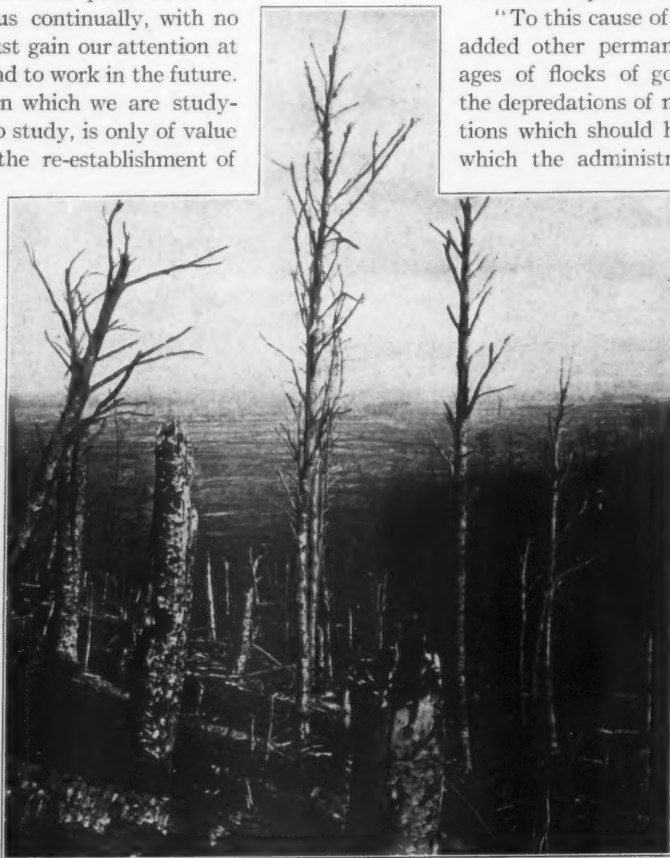
which electoral influences encouraged by guarantees of impunity.

"Thus the deforestation of the plains completed that of the declivities. The water courses, formerly well-regulated, were changed into torrents; the climatic conditions of the country were completely overthrown; and inundations alternated with drought in all the French river basins. The old oaks disappeared because they were needed in all parts of the world for railways; stands were felled to furnish tannin to different industries; journals, newspapers and paper of inferior books devoured the pines, beech, poplar, and linden.

"And now the artillery is destroying the trees. Bodies of the dead trunks of trees strew the soil with the debris of men and horses.

"Where the forest once stood are only seen scattered broken stumps. The forest has disappeared. A poet in the good old times arrested the arm of a woodcutter who caused to flow from beneath the "rude bark the life blood of a nymph"; but all the rhymers of the world can avail nothing against the rattle of shells and explosives belched forth by thousands of cannon.

"While the forests and groves of the immense battlefields are effaced or scattered under the lightnings of artillery, the forests of the interior and even the trees bordering the roads all over France are falling under the blows of the ax because railways must be improvised at the front and planks, supports, timbers for crosspieces



A SHELL-SWEPT FOREST OF FRANCE

The utter destruction of these forested slopes "somewhere" along the battle line in France makes the problem of future forests in the war-ridden sections a serious one, and one which is already attracting the attention of French foresters.



WAR'S DESOLATION IN A ONCE BEAUTIFUL WOODED VALLEY

Over this ground, near Verdun, France, has for months swept a storm of shot and shell. Practically every foot of it has been fought over and thousands have died, while where once stood fine trees there remain some gaunt, shattered skeletons, mute monuments to the tremendous struggle.

in trenches, and forts, sheds, magazines, and barracks of the military zone are needed.

"What will remain standing tomorrow?

"Even in the Bois de Boulogne, at the alarm in the beginning of the war, the trees were cut down which might hinder the 'defense' of three or four ridiculous pallisades. In the Jardin of Foreign Affairs, on the quai d'Orsay, a celebrated tree, venerable and magnificent, was sacrificed to establish a tennis court (15,000 francs) evidently necessary for diplomatic maneuvers. The dryad which protected this place succumbed to the nymphs of the embassy. Down with the trees!

"If we do not restore French forests, we shall gain victories and reconquer our provinces in vain. What happened to Nineveh and Babylon will happen to Paris. Civilization cannot flourish in a desert."

A dispatch from Verdun, France, says: With the close of the war the entire line of trenches in France, extending from Alsace to the Belgium border, may be converted into a sort of national sacred forest, as a permanent tribute to the memory of the French "poilus" who died there defending their national soil.

A proposition to this effect has just been prepared by the general council of the department of the Meuse, and will soon be submitted to the French government. The plan is to buy the battleground from the farmers. Should this plan be finally accepted, future generations, not only of France but of the entire world, would always have the opportunity of visiting the line of trenches over 600 kilometers in length on which the French threw back the tide of German invasion at the battle of the Marne, and which till the end of the war will always remain the basis of France's military effort to rid her soil entirely of the enemy.

The immediate land through which these long lines of trenches run, together with the battlefields of the Somme, of Artois and of Champagne will, it is believed, never again be rendered cultivatable. Aside from the deep trenches and bayous, the ground has been so pitted with shell holes to a depth varying from a few feet to fifteen feet, and all the upper strata of soil on which fertility depends so completely wiped out, that little if any use could ever be made of the ground for agricultural purposes for years to come.

FORESTRY FOR BOYS AND GIRLS

BY BRISTOW ADAMS

THE TREES IN WINTER



S BETWEEN skating, skeeing, sledging, and tobogganning we manage to be out doors a good deal at this winter season, and also have a better chance than in the summer to study the trees. They have uncovered themselves to us,

and if we know them at all well, this is the time that they are most easily recognized. But most persons do not know them well enough to understand the messages they give us when their cloaks of leaves are off.

Last year our boys and girls went to see the objects sent by other boys and girls to the exhibit of work done by children in the country schools of New York. This was during "Farmers' Week" at Cornell University, when thousands of farmers, with their wives and their children go to school for a week at the college of agriculture. There are lessons for every member of the family, and even a nursery to take care of the "teeniest-weeniest" babies while their mothers learn about cooking, and sewing, and how to look out for these tiny ones, so they may grow up to be straight and strong boys and girls.

But that isn't what I started to tell you. Last year four farm boys came to Farmers' Week with great bundles of twigs,—just a lot of sticks and branches, it seemed. They could tell at sight what kind of a tree or bush each came from. They knew by the shape of the twig, the form of the bud, the color of the broken end,—as with the brown pith in a butter-nut branch,—and by a number of other signs that they had learned. The professors in the forestry school at Cornell owned up that they couldn't have done as well as these boys did unless they had studied pretty hard beforehand.

My boys and girls have an old book-case that is their museum. Here they


have shells, rocks, twigs, and all sorts of butterflies, moths, and other insects that their Aunt Ruby taught them to collect and mount. The twig shelf is always having additions made, and the keys that unlock their secrets are being more and more used. First, we note the bark, then the buds, as to size, shape, and color; sometimes the winter fruits are present, and these help.

HERE are some of the tags we have learned: The position of the buds is a good index; for example, maple buds are opposite one another on the stem, while those of elm, poplar, and beech are alternated or zig-zagged up the stem. The catalpa and a few others have their buds in a circle around the branch. Color will help; sassafras bark stays green all winter, basswood is reddish, and some of the dogwoods a brilliant red.

Taste seems to be Toto's favorite way of telling. Ever since he could first grab anything it went immediately to his mouth; and he has never got over the habit. Sassafras and sweet birch are easy for most of us to tell by taste, but he says that tulip poplar, soft maple, cherry, walnut, elm, and locust are just as easy when you know 'em. The leaf-scar, where the old leaf came off last fall, is another sure sign, when you know it. Some folks say that the horse chestnut got its name from the fact that its leaf scar is shaped like the bottom of a horse's hoof.

Buds are probably the surest way the twigs have of telling their names, even though they can not speak out for our ears to hear. The sign-language of the buds is sure to those who know it. And one can't expect to talk on one's fingers at school unless the alphabet has been learned. Just so with the buds! The horse chestnut buds are large and sticky; those of the beech are long and sharply pointed, smooth and glossy; basswood buds are little fat ones. Some of you will note the silky buds of magnolia, others the red colored buds of maple, and the black ones of the pussy willow. In a general way the buds are something





like the leaves that come out of them. Basswood's leaves are roundish; so are the buds. Beech leaves and buds are similarly pointed.

This can be made a fascinating game if you wish, beginning with the few twigs you know and then adding others, until you have worked up to as many as fifty. You can have contests as to who can tell rightly the names of most of the twigs.

THE TREES themselves, by form or color, are easily told from a distance. Pin oak and black gum have shapes like the spruces, and this shape shows best when the leaves are off. Each has a spire-like top and the lower limbs are drooped and spreading. Yellow willow now gleams golden against the snow, and towards spring the outer twigs are almost startling in their color. Sycamores have erratic branches which seem to have changed their minds after they started growing and gone off in another direction. The branches of the persimmon give the whole body of the tree the shape of a cylinder, and their shape, too, is always angular. This is because two branches start and one fails to develop so the other goes angling off like the Indian swastika sign. The crown of tulip-poplar is generally an oblong and the elm is likely to have a vase form.

QUITE the most remarkable fact about the trees is that they are far from being as dead as they seem to be in winter and even without leaves they

are very much alive. The hardest work a tree does is to produce flowers and fruit and this is done by the witch-hazel without a sign of a leaf to help it. The red-bud, or Judas-tree, will cover itself with bloom in the spring, but it has warmth to help it, while the witch-hazel is not even held back by the dead of winter. We know, too, that it is still pretty cold and snowy when our old friend the sugar maple begins to nearly burst with sap.

The evergreens themselves look dead. Cedars get rusty, scrub-pine and pitch-pine are yellowish, and at least sickly-looking, and the white pine grows ashy and pale. They can be hurt by harsh drying winds in winter, when the ground is deeply frozen and their roots can not keep up the supply of moisture given off by the leaves. The very dearest-looking trees of all are the larches, and tamaracks, and cypresses, which we think of as "evergreens," but which are quite the barest and most naked in winter. By contrast the fresh soft green of the new larch needles is the "springliest" of all the glad young colors of the spring time.

LOOK for the winter fun in the woods, and learn the trees' stories. Have a winter picnic after a good skee-run, if you live where snow is deep, try one anyhow. We think they are more fun than summer picnics, and there's more to see; or else it is easier to see what there is.

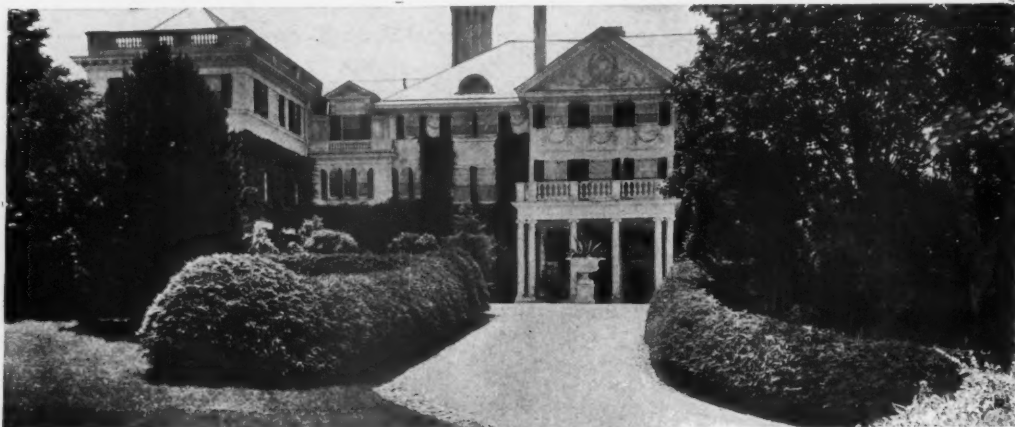
CHARADES FOR CHILDREN

Here Are Some Puzzlers for the Children. Who Can Answer Them? Those Who Cannot May Read the Answer in February American Forestry

My first is a much needed part of a house
My second a squirrel eats but never a mouse
Put these two together and then you will find
That it is a wood of the very best kind.
What is it?

My first is a part that a ship always needs
My second the way you always plant seeds
Now take these two and put them together
Then feed them some crumbs in this kind of weather.
What is it?





WHITE SPRUCE HEDGE AROUND AN ENTRANCE-COURT

Such a hedge costs but little more than privet. It is valuable all winter and is far richer in appearance. Now is the time to arrange for spring planting of hedges.

THE FUNDAMENTALS OF A GOOD HEDGE

BY J. J. LEVISON, M. F., FORESTER FOR THE CITY OF NEW YORK

HEDGES are generally planted for practical reasons, and not for mere beauty. As a rule, they serve the practical purpose of adding strength to the boundary line of a lawn or garden, of securing privacy to the premises surrounding the house, of screening out some objectionable object or of furnishing a windbreak. Its lines are thus more or less formal; but, nevertheless, when properly selected and placed the hedge may be in perfect keeping with the surrounding landscape effects and may even add considerably to the beauty of the place.

In deciding what kind of hedge to plant we must not only consider its æsthetic effects, but also its adaptability to the local soil and climate, and light conditions, as well as its freedom from insects and disease. For instance, hemlock will grow in shade and lilac will not. The hawthornes are often menaced by aphids and the rust of the "cedar apple"; lilacs by mildew and oyster shell scale; box by red spider, and spruce continually loses its compactness at the base of its trunk. To avoid all the natural pitfalls, one must thus choose carefully with anticipation of the conditions of the plant's future growth.

The varieties of plants which may be used for hedges are greater than one would ordinarily believe, if we were to observe the hedges of but one vicinity. The local nurseryman sometimes carries a limited variety of plants and the hedges of the locality often reach just that far and no further.

Foremost among the deciduous hedge plants come the privets. The one most commonly used is the California privet (*Ligustrum ovalifolium*). This is quick-growing and endures extremely unfavorable soil, moisture and atmospheric conditions. It is free from insect and fungous pests, and its cheapness makes it desirable for general use. The Japanese privet (*L. ibota*), Regel's

privet (*L. ibota regelinianum*) and the Amur River privet (*L. amurense*) are other desirable varieties of privets in common use for hedges. The California privet, above all others, however, is the one that lends itself to formal shearing. Japanese barberry (*Berberis thunbergii*) is beautiful when a low hedge is wanted. It forms a dense hedge and does not need shearing like the privets. It is hardy, droops beautifully and colors charmingly in the fall with bright red berries persisting all winter. The common barberry (*Berberis vulgaris*) and its purple-leaved variety are often used with less effect than the Japanese species.

The Japanese rose (*Rosa rugosa*) is very hardy under all conditions and forms a compact hedge that stands shearing very well. It has good foliage, beautiful flowers and large, red fruit which persist until early winter.

The hawthornes (*Cratægus*) are the favorite in England for hedges. *Cratægus axycantha* is the kind best adapted for hedging. In this country the hawthornes are much subject to fungous diseases, scale insects and borers, and should consequently be used rather cautiously.

Deutzia lemoine and *deutzia gracilis* are valuable hedge plants which should be allowed to grow naturally, without shearing.

The Rose of Sharon (*Althea*) makes an excellent hedge for boundaries where a screen is wanted, but its habit is higher than the privet or barberry.

A few other deciduous shrubs which can be used for hedging purposes are: *Hydrangea paniculata grandiflora*; this, of course, must be cut in every winter; the lilacs make satisfactory hedges; Van Houtte's spirea makes a beautiful spring ornamental hedge and *Aralia pentaphylla* is so rapid a grower and adapts itself to poor soil so readily that we must not overlook it in our list of suitable plants.

The Garland Syringa (*Philadelphus coronarius*) makes a tall-growing, informal hedge.

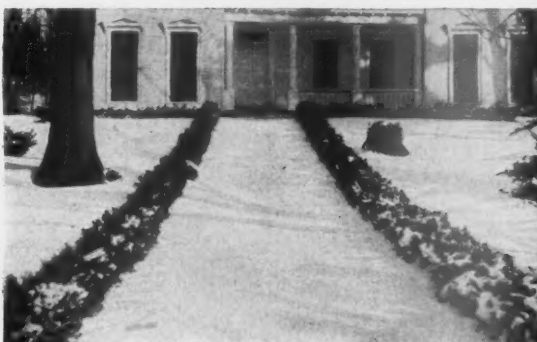
The European beech is useful where a tall hedge is desired. The honey locust is a good defensive hedge and the Lombardy and Bolleana poplars allow close planting and form a tall screen. The Osage orange has the same value as the honey locust but does not grow as tall.

The most desirable species of this group are: boxwood, arbor-vitæ, hemlock, white spruce, common red cedar, yew and dwarf juniper.

Spring and fall are the two seasons for planting, but, if possible, spring is to be preferred.

Before planting, the soil should be thoroughly turned over to a depth of two or three feet and two or three feet wide. Mix in some well-rotted manure, and if the soil is very poor, change it entirely for a rich, black loam. This can all be done in the fall and thus save time in the spring when only the actual planting will be left to do. The distance apart at which the individual plants should be set in will vary from twelve to eighteen inches for shrubs and from eight to twelve feet for tree hedges. Do not plant too closely if you wish your hedge to look compact with plenty of lateral shoots. The roots should be carefully covered during the process of planting and spread out when set in the ground and the soil around the roots should be thoroughly firmed by ramming or by treading.

Immediately after planting, plants like privet which stand heavy cutting should be pruned



A YEW HEDGE

These hedges have many admirers and are unique for dividing rose gardens and flower gardens.



COLORADO BLUE SPRUCE

For seaside planting the Colorado spruces have proved themselves of high value.



By Courtesy of J. Horace McFarland Company.

ALTHEA HEDGE

This is especially desirable for surrounding the flower garden or vegetable garden. Do not trim them in the summer. If you plant them a foot apart they will make a solid, thick, free-flowering hedge this year.

back severely, sometimes to a few inches from the ground. This will insure the formation of a compact growth on all sides of the hedge and a better adaptation of the plant to the soil. The following year the plants should be cut a little less heavily, and by the third year the permanent shaping may be commenced. In the case of privet it should be clipped three times a year.

The after-care of the hedge consists in keeping out all weeds and in trimming the plants to induce bushy growth near the base. This is very important, particularly with young hedges. The hedge should also receive frequent cleaning so no insects can gather there and remain to despoil the growth.

General trimming of established medium-sized hedges is necessary at frequent intervals in order to insure the formation of lateral shoots for a dense appearance. The work can best be done in the early spring while the sap is still down. The formal hedge of privet and similar species should always be cut in some form of a triangle in order to obtain the greatest exposure of surface to sun and light, thereby securing a more vigorous growth of all parts of the hedge. The loose hedge of such a species as the barberry needs just to be kept down to uniform shape by the removal of stragglers. Where high stumps are seen protruding from old hedges, they should be removed and the more vigorous younger shoots allowed to take their place. All these large wounds and cuts should be covered with coal tar

to prevent disease taking hold of the plants and insects from finding an easy entrance to the interior of the plant. Coal tar is preferable to paint for this purpose because the tar has an antiseptic

and extreme cold during the winter months will be found helpful to the growth and even necessary at times.

In the matter of protection from insects and fungi the same principles apply here as to the other plants. The



40-YEAR-OLD HEMLOCK HEDGE

This is a dense evergreen wall, as rich and mature as 100-year-old boxwood; for a garden or service-court, you can consider this hemlock hedge. It is 600 feet long, 11 to 12 feet high and 10 to 12 feet wide.



ANOTHER HEMLOCK HEDGE

This treatment will give an effect similar to old yew hedge in England. Their attractiveness is partly due to the long years of skilful trimming. This hemlock hedge has had this trimming.

as well as a protective influence on the wound, while the paint only remains on the surface, drying up in course of time and eventually peeling off.

An annual mulch of leaf-mold or well-rotted stable manure, put on before the ground freezes, is also desirable for the maintenance of good hedges, and in case of boxwood and the smaller evergreen plants, protection from wind

scale or sucking insects will have to be sprayed with some oil emulsion or fish oil soap, the leaf-eating insects with arsenate of lead and the fungous diseases with Bordeaux mixture. However, these are only general instructions and the only effective way to meet insect and fungous pests is to determine in each case individually just what to do and how to do it.*

ADVICE FOR JANUARY

1. Remove the dead trees marked during the previous fall for removal.
2. Clear out cavities in diseased or injured trees and dress the wounds with coal tar.
3. In the wooded area, one can cut out all chestnut suckers coming from the old stumps of the dead chestnut trees. These suckers are likely to become re-infected with the chestnut blight and had better be cut out to prevent their smothering young trees of greater value.
4. In the wooded area one can also do some light thinning or improvement cutting, which consists of removing all growth interfering with vigorously growing specimen trees or with trees of greater value from an æsthetic point of view. One can also take the young shoots growing out of oak stumps or of stumps of other

desirable species and by cutting off a few of the poorer shoots the better ones can be encouraged to grow more vigorously and straighter.

5. The egg masses of the tussock moth and similar insect pests can be removed and burnt to advantage in this month. Some of these egg masses contain from twenty-five to four hundred eggs and the destruction of a single egg mass means the prevention of that many caterpillars during the following summer. Do not drop these eggs and cocoons on the ground because they will hatch there in the spring just as well as they would on the trees.

6. Look over your tools, ladders, spraying apparatus, hose and rope and do the necessary repairs before the active work time of spring comes.

QUESTIONS AND ANSWERS

Q. My neighbor uses arsenate of lead for spraying. Will you please tell me what arsenate of lead is composed of, when and how to use it and how I can make it?

J. L. B., Mt. Vernon, New York.

A. Arsenate of lead is a chemical appearing on the market in either paste or powder form and is used in solution with water as a spray against all leaf-eating insects, such as caterpillars, elm leaf beetle, etc. It is generally used in a mixture of water at the

rate of one pound to 10 or 15 gallons of water. By spraying the leaves with it the leaf-eating insects feed on the poisoned leaves and become poisoned themselves. A chemical analysis of arsenate of lead shows the following constituents: Lead expressed as lead oxid about 30 per cent; arsenate expressed as arsenic oxid about thirteen and a half to sixteen per cent; soluble arsenic oxid about one-half of 1 per cent, and soluble impurities not over 3 per cent, and water not more than 50 per cent.

*Photographs by courtesy of Isaac Hicks & Sons.

Q. What steps shall I take to prevent fire on my woodland?
M. J. K., Tarrytown, New York.

A. Do not let any loose brush lie around. Put up posters warning trespassers not to drop lighted cigars, matches, etc. Place a tool box in some inconspicuous corner and have it filled with fire-fighting tools, such as old brooms, axes, iron rakes, etc. Have numerous paths through the woodland and keep these free from litter.

Q. When shall I prune my apple trees?
F. K., Freehold, New Jersey.

A. In March, though you may remove the dead branches at almost any other time.

Q. First. What is the scale of which I am sending specimens? Second. What is the best treatment for the tulip scale? Third. Do you think the Norway maple would be successful in this locality? The *Ginkgo Biloba* (Japan Maiden Hair Tree)? Fourth. What would you suggest for narrow paved street, also for suburban planting?

Fifth. Most of the elms here are in cramped paved streets, seem to go to pieces if allowed to grow large and spread (poor root work presumably) but pick up if heavily pruned. Do you advocate pruning heavily on such elms?

Sixth. Could you give or refer me to the damage or cost of control of the White Marked Tussock Moth in the New England States?

D. L. B., Charleston, South Carolina.

A. First. The specimen you have submitted is affected with aspidiotus ancyclus, and the remedy is to spray the affected parts with kerosene emulsion, one part to twenty parts of water, in the month of July, when the young insects emerge.

Second. The best treatment for the tulip scale is to scrape all the old insects from the branches in the fall and then spray or wash the infested limbs with kerosene emulsion, one part to ten parts of water.

Third. The Norway maple ought to grow, though not as vigorously as further north, in the vicinity of New York City. The ginkgo will do well.

Fourth. For planting in a narrow street, use ginkgo and Lombardy poplar, and for suburban planting use pin oaks, European and American linden, tulip tree, sweet gum, red maple, red oak, elm—both American and European.

Fifth. As to pruning if done at all, it should be done lightly at frequent periods, instead of resorting to heavy pruning. It is advisable to get at the roots and to encourage them with larger spacing in the sidewalk, better soil, manure and cultivating and watering. Where an elm must be pruned, the work is justified on the ground that an elm as much as most other species will stand pruning.

Sixth. The tussock moth will completely defoliate lindens, maples, etc., in early summer. Work of extermination consists in collecting and burning egg masses in fall and winter and spraying with arsenate of lead for caterpillars in June and early July. The average cost is from 18 cents to 25 cents per tree.

Q. I am writing for your advice about setting out several acres in white pine. Where can these trees be had to best advantage? At what intervals should they be planted with a view to making a dense screen, and how large would you advise setting them out so that they would grow to advantage? Would you suggest any other variety for the purpose indicated? Rapidity of growth and a screen the year around are the principal desiderata. I should greatly appreciate the fullest information you can give me in the premises, prices, number to the acre, etc.

E. G. B., Dover, Delaware.

A. With regard to your contemplated planting, I would not wish to recommend for your purpose the white pine, because of the very serious danger which threatens in the shape of the blister rust. Though the disease has not appeared as yet in Delaware, it is in New Jersey and other states close by. Besides the loblolly pine or Norway spruce would be just as good, if not better, for your purpose, in view of the fact that you desire quick growers to make a dense screen all the year round. Would suggest that you plant these in three or four rows and about ten feet apart, alternating the placing of the trees in each row so that in every other row the trees will stand opposite each other. I would not recommend your purchasing larger than four-year-old transplants, as they would not only be very expensive, but these large trees sometimes take several years to start growing properly, during which time the younger ones would catch up with their growth, and you would stand so much better chance of a vigorous growth with this size. None of this applies if your land to be planted is damp or swampy, for you would have no success with these species. You can write with safety to any of the nurserymen advertising in *AMERICAN FORESTRY* and depend absolutely on information or stock they may send you.

Q. Let me know what you advise for spraying apple trees this month. Our farm in New Canaan, Connecticut, has about sixty old apple trees on it. We have sprayed for the past three years, using Scalecide, lime-sulphur and arsenate of lead. When we purchased the farm three years ago we were told that the trees were affected by scale. We think most of that is cured. The tent caterpillar was rather troublesome. The fruit was not as large or perfect this summer and I should like to know what you would advise.

J. E. W., New York City.

A. Replying to your inquiry, spray in the fall or early spring, before the buds open, with lime sulphur wash for scale insects. It is good practice to spray once a year with lime sulphur, no matter whether the trees are badly infested with scale or not. The arsenate of lead is only useful against leaf-eating insects such as tent caterpillars. Apply the mixture in early summer, when the leaves are out and in danger of being eaten. To increase the production of fruit, prune the branches in the fall, root-prune in early spring, and fertilize with well rotted manure. If you follow these suggestions you will be well pleased with your results.

Q. I have recently transplanted an American Holly. The work was well done, the tree being moved with a large unbroken ball and few roots exposed. The tree is about 12 feet high and a very good specimen. Some of the supposed experts here tell me I should strip it of its leaves if I wish it to do well. Please let me know what you think necessary to insure successful growth. I have also moved some very large boxes—bush variety.

J. S. F., Baltimore, Maryland.

A. As to transplanting your holly I would not feel that it is necessary to strip the tree of its leaves, though this is very often done. Would advise, however, that you mulch both the holly and the box heavily with leaf mold and some well rotted manure, and also that you protect them, at least for the first winter, with a covering of thin canvas or boughs of evergreen trees. I am sure that with the precautions taken in your transplanting operations, you will have success with them.

DURING the fiscal year 1916, 705,872 acres of National Forest timberlands were estimated and mapped intensively, and 1,093,006 extensively. In all, 20,815,798 acres have been mapped by intensive methods and 47,291,660 by extensive methods.

THE FIGHT AGAINST THE PINE BLISTER DISEASE

Congress and States to Be Asked for Appropriations and for Authority to Enforce Stringent Quarantine Regulations.—The Situation in the Various States and an Outline of What Should Be Done in the Campaign Against the Disease

THE fight against the blister disease which threatens to exterminate the white and other five-leaved pines of the United States and Canada is steadily progressing.

A bill is to be presented to Congress asking for \$500,000 for the Department of Agriculture to use in investigation, scouting, and in coöperation with the states, in determining the presence of and in eradicating the disease.

Another bill will ask that Congress give the Federal Horticultural Board authority to declare a quarantine in any state or district where the members deem such a quarantine is necessary to prevent infection.

Massachusetts is asking its State Legislature for \$60,000 to fight the disease and other states are preparing to demand appropriations and to authorize quarantines.

The American Forestry Association is conducting a nation-wide publicity campaign to acquaint the people with the dangers of the blister disease and with the necessity for immediate action in the effort to retard its progress and if possible to stamp it out.

Governors of various states and of provinces of Canada have appointed delegations to attend the International Forestry Conference at Washington, D. C., January 18 and 19, on the occasion of the thirty-seventh annual meeting of the American Forestry Association, to discuss measures for combating the disease; many coöperating organizations have also appointed delegates to attend this meeting, and members of the Association and kindred organizations from all sections of North America will be present.

Following the addresses, discussions and conferences there will be immediate national and state legislative activity in the endeavor to secure the passage of the necessary appropriation and quarantine bills. Officials of various states where the infection has been found are now preparing bills for submission to the legislatures, many of which convene in January, while in other states where no

infection has appeared, but where there is a growth of white or five-leaved pine which may be infected, state officials are preparing to take the necessary steps to give authority for such quarantine regulations as are needed under the circumstances.

A general résumé of the introduction of the disease into this country, its spread, the present situation, and the needs for the future are here given:

The white pine blister disease has made impracticable the growing of the American white pine in Denmark, Holland, and England, and has seriously interfered with its culture in Germany. All the five-leaf pines of the United States have been shown to be susceptible to the disease, and the conditions favorable for its spread have been found in all regions where these pines grow. Although no personal investigation has been made in Europe by the United States Department of Agriculture, indications are strong that American conditions, particularly climate, and currant and gooseberry hosts, are more favorable to the disease than conditions in Europe. The disease has already become a very serious menace in one of the three great white pine regions in the United States. The white pines, because of their wide distribution, the proportion and high values of their woods, their rapid growth, merchantability at an early age, resistance to brown-tail and gypsy moth, and ability to thrive on poor soils and under adverse conditions, are among our most valuable forest trees, considering both present conditions and the possibility of future production.

Two years ago the disease was known to be present only in very restricted localities, where it had been introduced directly on European nursery stock, mostly from Germany. It has spread rapidly.

In Maine five infected plantings and one infected nursery have been located; in every case the disease has spread to native pine. On currants and gooseberries the disease is generally distributed

WHAT HAS BEEN DONE TO FIGHT THE PINE BLISTER DISEASE

1. A Federal quarantine against the importation of white pine from Europe was established in 1912, and last year the Federal Horticultural Board requested nurserymen in the East not to ship white pine, currants, or gooseberries west of North and South Dakota, Nebraska, Kansas, Oklahoma, and Texas. This request is known to have been disregarded in at least ten cases. Canadian white pine stock was excluded last winter. A limited number of states have also established quarantines against the importation of white pine stock from outside states.

2. A considerable amount of publicity has been given by Federal and State agencies, the American Forestry Association, and other associations to the prevalence and spread of the disease and its possible results.

3. A large amount of scouting has been done by Federal and State agencies within the areas of possible infection.

4. A large amount of eradication of diseased currant and gooseberry bushes and white pine has been done in the New England states, but much remains to be done. Complete eradication east of the Hudson River is probably not possible. West of the Hudson River practically all of the infections found have been destroyed.

5. The Forest Service last year, after learning of the seriousness of the situation, prohibited the use within the National Forests of white pine and currant and gooseberry stock from Eastern nurseries.

plantings and one infected nursery have been located; in every case the disease has spread to native pine. On currants and gooseberries the disease is generally distributed

throughout the white pine section of the State.

In New Hampshire infected pine was found in four plantings and infected currants and gooseberries in sixty-nine out of the one hundred and nineteen towns scouted (57 per cent); three nurseries contained infected currants and gooseberries.

In Vermont infected currants and gooseberries, particularly black currant, were found in nearly every section of the State visited during 1916: infected pines were found in ten plantations.

Massachusetts is by far the most seriously infected State. This is well explained by the fact that importation of pine nursery stock from Europe was continued on a large scale and with official encouragement until 1912, or for three years after the state authorities were warned of the danger by the United States Department of Agriculture and by the action of neighboring states. Forty-nine infected plantings have been found. In eight localities the disease has spread to native pines. Currants and gooseberries are generally infected in the eastern and western thirds of the states, scattering infections occur in the central third.

In Rhode Island there is one infected pine plantation near Newport, and scattered infections of currants exist throughout the state.

In Connecticut, out of thirty plantations and sixteen nurseries inspected, the disease was found in ten plantations and one nursery. In northwestern Connecticut the disease has spread from an infected plantation to native pines and covers an area of about 40 square miles on currants and gooseberries. Scattered

WHAT SHOULD BE DONE BY THE U. S. DEPARTMENT OF AGRICULTURE TO FIGHT THE PINE BLISTER DISEASE

1. Immediate Federal quarantines of the infected states or parts of states to prevent, if possible, the further spread of the serious conditions existing east of the Hudson River to the Lake states and other parts of the eastern white pine region now but slightly infected, and to exclude the disease from the Inland Empire and California. Authority for the necessary action rests with the Federal Horticultural Board, which has had the matter under consideration for more than a year.

2. It is fundamentally important that the country west of the Mississippi, in which the disease is not now known to exist, be protected. If the above quarantine cannot be declared, then Congressional action should be secured, prohibiting the shipment of five-leaf pines or currants and gooseberries from East to West across the Mississippi Valley.

3. Greater efforts should be made to educate the public regarding the seriousness of the situation and to arouse public opinion and force action and adequate legislation to independent states. Inadequate power on the part of many states to eradicate the disease when located is by far the most serious handicap to fight.

4. The strengthening of the police power of the Department to the limit of Congressional authority, if this has not already been done, with the appropriations to make it effective, or if Department authority cannot be made effective, authority to cooperate fully with the states. These powers should be used in experiments to determine the practicability of wholesale eradication of currants and gooseberries, locating infected areas, eradicating isolated infections, and as a minimum holding serious infections within their present boundaries.

cases of infected currants and gooseberries were found in sixty-five of the one hundred and ten towns scouted.

East of the Hudson River in New York there are two large infections of native pine with general infection of adjacent currants and gooseberries in Essex County, two infected plantings, and three nurseries containing diseased pine. Currant and gooseberry infection is general in Columbia County, having spread from Massachusetts.

It is then obvious that east of the Hudson River infection is so general that white pine growing will only be possible in areas which can be freed from all currant and gooseberry plants and kept free permanently.

Infections west of the Hudson River are not known to be so serious. West of the Hudson River in New York eight infected plantings were found, three nurseries with infected pine, and six nurseries with infected currants and gooseberries. Infected currants and gooseberries were found in forty-two other localities, mostly near Geneva and in Niagara County. In no place can the disease be considered to be beyond control

by the eradication methods now in use.

In New Jersey infected white pine has been found in four nurseries and in two plantings and diseased currants and gooseberries in one nursery and one estate.

In Pennsylvania infected pine was found in two nurseries and in three plantings.

No infections have been found in Delaware, Maryland, Virginia, North Carolina, Kentucky, Tennessee, West Virginia, Michigan, Illinois, or Indiana.

WHAT THE PINE BLISTER DISEASE INVOLVES FROM THE STANDPOINT OF FORESTRY AND LUMBERING

1. Present merchantable timber values aggregating around \$275,000,000, a part of which are threatened.

2. Present values of immature timber practically impossible to appraise and a part of which has been planted artificially, which in the East are seriously threatened.

3. Nursery stock and investments, Federal, State, and private.

4. Possibility of future production of the most valuable trees in several regions of from two and a half to nine billion feet annually seriously threatened. This means the highest use of from 30 to 40 million acres of comparatively poor lands which otherwise would be used less advantageously or not at all, the support of a local population, local lumber and wood manufacturing industries, and of many allied industries, local and otherwise.

Infected white pine was found in one nursery in northeastern Ohio.

In Minnesota four infections, and in Wisconsin two infections, have been found along the St. Croix River, with the possibility of infection in an area about forty miles square.

Considerable infection has been located in the lower Ontario peninsula of Canada, but the Canadian authorities appear to have this situation well under control. An infection of unknown extent has been located very recently near Montreal.

In the territory west of the Mississippi River, a general search has been made for the blister disease, following obvious clues of shipments of pine, currants and gooseberries. The disease has not been found. There is no natural way in which the disease can spread into this territory, *i.e.*, it can only come in on nursery stock. The danger of its introduction on nursery stock is, however, as great as it ever was.

IMPORTANCE IN TIMBER PRODUCTION

There are about 13 billion feet of merchantable white pine in the Northeast, worth in the neighborhood of \$75,000,000. The development of private forestry, largely through the presence of the eastern white pine, has gone further in this region than in any other part of the United States. The area planted to white pine is conservatively 50,000 acres, and 10,000,000 seedlings are probably planted each year. Within this region there are



PINE BLISTER INVESTIGATORS

Representatives of practically all the states in the white pine belt, of Canadian provinces, of the United States Department of Agriculture and of the American Forestry Association and state forestry associations met at Albany, New York, recently to report upon the extent of the pine blister outbreak and to discuss ways of combating it.



PINE INFECTED WITH BLISTER

Four-year white pine tree diseased with white pine blister disease. Badly swollen but not yet showing fruiting bodies of the parasite.

5,000,000 or nearer 10,000,000 acres more suitable for the production of forest trees than for any other purpose, in which the white pine was an important tree in the original stand and in which it will undoubtedly be the best individual tree for future use. If the blister rust is not or cannot be suppressed, it seriously threatens the elimination of

the white pine as a forest tree of economic value in this region.

There are still in the lake states in the neighborhood of twelve billion feet of merchantable white pine, worth probably \$96,000,000. There are probably 2,000,000 acres or more of young growth in which a considerable percentage of the stand is white pine. At least 3500 acres have been planted. In addition to private and state nurseries the Federal Government maintains others with an output of from 400,000 to 500,000 seedlings annually. At least 5,000,000 and probably nearer 10,000,000 acres in the lake states are undoubtedly more valuable for the production of timber than for any other purpose. White pine was the important tree of the original stand and it should be for future production. Under forest management,

if the blister disease is kept out, an area now largely unproductive could be made to produce annually from one to four billion feet of the valuable white pine.

Private holdings of western white pine in the Inland Empire amount to about twenty billion feet and Federal holdings to about ten billion. The timber on the average

is worth from \$2.50 to \$3 per M. A Forest Service nursery in western Montana now produces about two and one-half million seedlings of western white pine annually, and the Service has already planted and seeded at least 8000 acres. Merchantable western white pine is found over an area of about 27,500,000 acres. It forms an important percentage of the stand over 5,000,000 acres. From 2,000,000 to 3,000,000 acres bear young growth. Present annual growth equals about 150 million feet and this under continued management could easily be doubled. Selected acres show a production of 100,000 feet per acre in 120 years. The tree occurs largely in a mountainous region where if the blister disease were once established its control would be exceedingly difficult and costly, if not impossible.

The sugar pine of California occurs as a merchantable tree over about 20,000,000 acres, and forms an important percentage of the stand within about 3,000,000 acres. It should be found permanently in forest mixtures on about 10,000,000 acres. There are about 14 billion feet of sugar pine on the National forests and 20 billion in private holdings, worth on the average about \$3. The present

annual growth of sugar pine is about 100 million feet, and this can be considerably increased under management. Sugar pine, like the western white pine, occurs in a mountainous, inaccessible country.

This is the situation reduced to cold facts. The task of preventing the further spread of the disease is now up to the National Government, the State Governments, and the people. It may already be too late to save the pines.

Little attention was given the chestnut blight when it first appeared. Later when its danger was realized hundreds of thousands of dollars were spent in an effort to overcome it. That failed. More money was spent in the effort

to confine it to certain areas. It was too late. That failed also—and now we can consider our chestnuts as doomed.

Is it too late to save the pines? That, the future alone can answer. It is not too early to try to suppress it, to stamp it out, if possible, and, at any rate, to retard its progress or to confine it to areas where it is already apparent. But if action is to be taken, it should be taken at once. There should be no delay. Action prompt, vigorous, and far reaching is desired.



PUBLICITY ON THE PINE BLISTER DISEASE CAMPAIGN

The battle to arouse public sentiment as to the importance of checking the spread of the pine blister disease has been started on a country wide basis by the American Forestry Association with the establishment of a publicity bureau. This department collects data from every state in the Union and in Canada and keeps the newspapers informed. Every Washington correspondent of a newspaper, the Associated Press, the United Press Association and the International News Service, with their daily papers aggregating 10,000 clients, are served with regular news bulletins dealing with developments in the various states. The copy is written on stencils and then put on a machine, so anywhere from a dozen to a thousand copies of a "story" may be run off in a short time. Russell T. Edwards has been placed in charge of the publicity work with a corps of assistants.

MEMBERS OF THE COMMITTEE OF SUPPRESSION

The Committee for the Suppression of the Pine Blister Disease of North America comprises the following:

- ARIZONA—A. W. Morrill, State Entomologist, Phoenix; E. P. Taylor, Tucson.
 CALIFORNIA—G. M. Homans, State Forester, Sacramento; E. O. Essig, University of California, Berkeley.
 CANADA—Dr. C. Gordon Hewitt, Dominion Entomologist, Ottawa; G. C. Piché, Chief of the Forest Service, Quebec; Clyde Leavitt, Forester, Commission of Conservation, Quebec.
 COLORADO—W. J. Morrill, State Forester, Fort Collins; C. P. Gillette, State Entomologist, Fort Collins.
 CONNECTICUT—W. O. Pilley, State Forester, New Haven; Dr. W. E. Britton, State Entomologist, New Haven; Prof. J. W. Toumey, Director, Yale Forest School, New Haven; Dr. G. P. Clinton, New Haven.
 DELAWARE—Wesley Webb, State Board of Agriculture, Dover.
 ILLINOIS—E. A. Sterling, Mgr. Trade Extension Division, and R. S. Kellogg, Secretary Natl. Lumber Mfrs. Assn., Chicago; Stephen A. Forbes, Entomologist, Urbana.
 INDIANA—Frank N. Wallace, State Entomologist, Indianapolis; E. A. Gladden, Secretary, State Board of Forestry, Indianapolis.
 IOWA—R. L. Webster, Acting State Entomologist, Ames.
 KENTUCKY—H. Garmon, Agricultural Experiment Station, Lexington; J. E. Barton, State Forester, Frankfort.
 MAINE—Frank E. Mace, Forest Commissioner, Augusta; Prof. John M. Briscoe, University of Maine, Orono; E. E. Ring, Bangor.
 MARYLAND—Thomas B. Symmes, Director, Maryland State College of Agriculture, College Park; F. W. Besley, State Forester, Baltimore.
 MASSACHUSETTS—Wilfred Wheeler, State House, Boston; Harris A. Reynolds, Sec., Massachusetts Forestry Assn., Boston; F. W. Rane, State Forester, State House, Boston; William P. Wharton, Groton.
 MICHIGAN—A. C. Carton, Secretary, Public Domain Commission, Lansing; L. R. Taft, State Board of Agriculture, East Lansing.
 MINNESOTA—W. T. Cox, State Forester, Saint Paul; F. L. Washburn, State Entomologist, St. Anthony Park; E. M. Freeman, Plant Pathologist, St. Paul.
 MONTANA—John C. Van Hook, State Forester, Helena; M. L. Dean, State Horticulturist, Missoula.
 NEW HAMPSHIRE—E. C. Hirst, State Forester, Concord; Philip W. Ayers, Forester, Society for the Protection of N. H. Forests; Prof. O. R. Butler, Botanist, N. H. College, Durham; Prof. W. C. O'Kane, Entomologist, Durham.
 NEW JERSEY—Harry D. Weiss, Chief Nursery Inspector, New Brunswick; Mel. T. Cook, Plant Pathologist, Agricultural Exp. Station, New Brunswick.
 NEW YORK—C. R. Pettis, Conservation Commission, Albany; Prof. George G. Atwood, Chief, Bureau Plant Industry, Albany; Victor A. Beede, Secretary, New York State Forestry Assn., Syracuse.
 NORTH CAROLINA—J. S. Holmes, State Forester, Chapel Hill; Franklin Sherman, Jr., Entomologist, Raleigh.
 OHIO—N. E. Shaw, Chief Bureau of Horticulture, Columbus; Edmund Secrest, Forester, Wooster; A. D. Selby, Botanist, Agricultural Exp. Station, Wooster.
 OREGON—F. A. Elliott, State Forester, Salem.
 PENNSYLVANIA—J. G. Sanders, State Entomologist, Harrisburg; Robert S. Conklin, Commissioner of Forestry, Harrisburg.
 RHODE ISLAND—Jesse B. Mowry, Chepachet; Prof. H. H. York, Brown University, Providence; Lr. A. E. Stene, Entomologist, Providence.
 SOUTH DAKOTA—George W. Roskie, State Forester, Custer.
 TENNESSEE—R. S. Maddox, Forester, Nashville.
 VERMONT—A. F. Hawes, State Forester, Burlington.
 VIRGINIA—A. C. Jones, State Forester, Charlottesville; W. J. Schoene, Entomologist, Blacksburg.
 WEST VIRGINIA—A. B. Brooks, Forester, West Virginia University, Morgantown; J. A. Viquesney, Forest, Game and Fish Warden, Belington.
 WISCONSIN—L. R. Jones, Professor of Plant Pathology, Madison; F. B. Moody, Commissioner, Madison.
 American Forestry Association—Charles Lathrop Pack, Lakewood, N. J.

WATER-POWER ON NATIONAL FORESTS

IN the fiscal year 1916, says Henry S. Graves, Chief of the Forest Service, in his annual report, twenty new water-power projects which utilize National Forest land began operation. This was an increase of eighteen

Concerning the report prepared by the Forest Service in response to a resolution of the Senate calling upon the Secretary of Agriculture for information regarding the ownership and control of water-power sites and any facts bearing

on the question as to the existence of a monopoly in the ownership and control of hydroelectric power in the United States, Mr. Graves says: "This report presented in far greater detail than has ever been attempted before, an exhaustive analysis of the general power situation. It showed a marked concentration of definite and complete control of a large percentage of developed water power by a very few companies. Data presented regarding interrelationships through common directors and principal officers indicated a marked tendency toward association or community of interests, particularly between the principal holding companies. The movement toward concentration in commercial central stations of all the primary power employed in the electrical industries and in manufactures was found in all sections of the United States, the

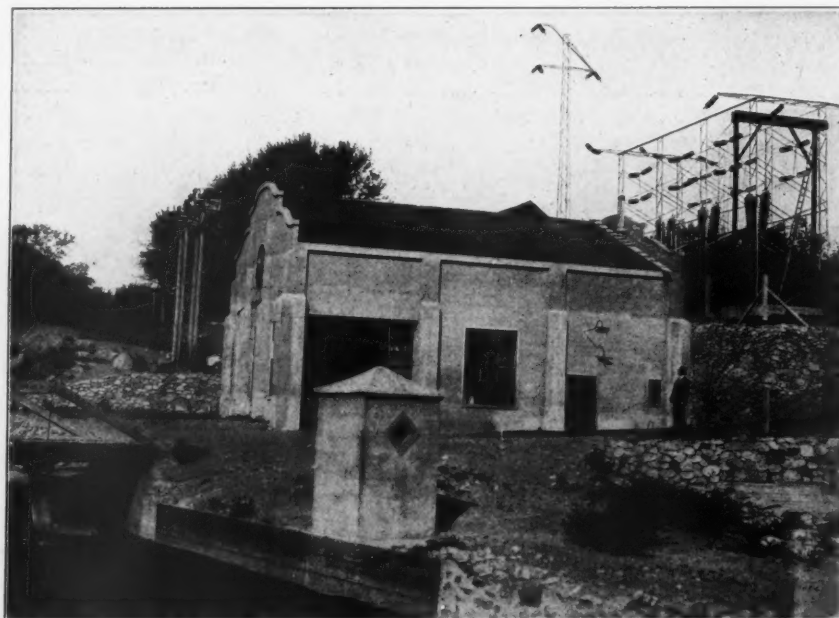


POWER HOUSE NO. 2, PACIFIC LIGHT & POWER CORPORATION

This plant has an installation of 47,000 horsepower which will eventually be increased to 94,000. This and another power house of the same size and owned by the same company are on the Sierra National Forest, California. They are the first units in an ultimate development of about 250,000 horsepower, all on the Sierra National Forest, constructed and operating under a revocable permit issued by the Secretary of Agriculture on July 16, 1913

and one-half per cent in the total number. In the fiscal year 1915 the number of new projects which began operation was twelve. Forty-two per cent of the total developed water-power of the United States utilize National Forest land, the Forest Service figures show.

Development of relatively small projects is particularly in evidence, according to Mr. Graves, in the Rocky Mountain States. California leads in the amount of power under permit and in operation. The number of transmission line permits in effect was increased by thirteen during the year. The forty applications for power-project permits received in 1916 included eight from Alaska—a notable evidence, according to the report, of increased local interest in power development on National Forest lands there.



A POWER HOUSE ON THE INYO NATIONAL FOREST

This is the No. 6 power house of the Nevada-California Power Company on Bishop Creek, Inyo National Forest, California

rate of concentration during the period 1902-1912 being highest in the South Atlantic States and the extent of concentration greatest in the Western States.

"The rate of increase in water-power development for public service use from 1902 to 1912 was approximately three times as great as in steam power. Primary power installation from all sources and for all uses increased from 1902 to 1912 more than two and one-half times as rapidly in the eleven Western States as in the remainder of the United States, while the increase for primary electric power for the same period was 440 per cent for the Western States, as against 226 per cent in the other States. The development per capita of the Western States in 1912 was two and one-half times as great as in other parts of the country.

"The report showed a considerable over-development in nearly all the power centers of the Western States—California, Oregon, and Washington in particular showing installations far in excess of maximum demands."

SAVING A FAMOUS TREE

JAMES DEERING, of 606 Michigan Avenue, Chicago, has come to the rescue of a tree and as a result the famous old wild fig of Miami, Florida, has a new resting place. This is on the Deering estate at Cocoanut Grove, Florida, which is one of the most beautiful in the country. The attention of AMERICAN FORESTRY was called to the tree by Mrs. Francis Hall Murdoch of the



FAMOUS OLD WILD FIG TREE

This tree at Miami, Florida, an old Seminole Indian landmark, was about to be destroyed when James Deering, of Chicago, paid \$500 to have it removed to his estate at Cocoanut Grove and there preserved.

Hotel Schenley, Pittsburgh, who told how it was about to be cut down to make way for improvements despite all the many interesting old Seminole Indian legends that include the tree in their lore.

A contractor told Mr. Deering that for \$500 he could move the tree and guarantee that it would live, so Mr.

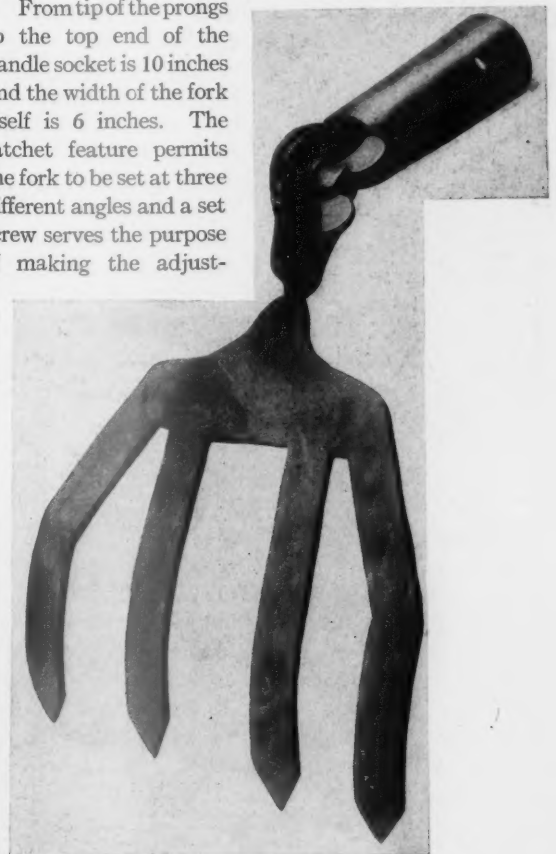
Deering ordered the removal. The tree has a place of honor on the magnificent grounds being laid out by the Chicagoan.

The estate in the Coconut Grove district will be very hard to excell, Mrs. Murdoch writes, as eight hundred men have been at work clearing the grounds and making the improvements. She particularly commends Mr. Deering for not erecting walls eighteen feet high and thus keep the public from enjoying the view.

A FOREST FIRE FORK

THE accompanying picture is that of a fire fork designed by John L. Strobeck, district forester of Pennsylvania for the purpose of being carried conveniently as a handy tool for forest fire fighting.

From tip of the prongs to the top end of the handle socket is 10 inches and the width of the fork itself is 6 inches. The ratchet feature permits the fork to be set at three different angles and a set screw serves the purpose of making the adjust-



ments secure. This fork has been tried out in actual service, and its parts are so proportioned as to give it working balance.

When it is needed, the user cuts a stick for a handle and inserts it in the socket. A nail kept handy may be driven through the hole in the socket into the handle to fasten same.

It may be taken apart and carried in the pocket, or still better, in a small case made to fit the pocket.

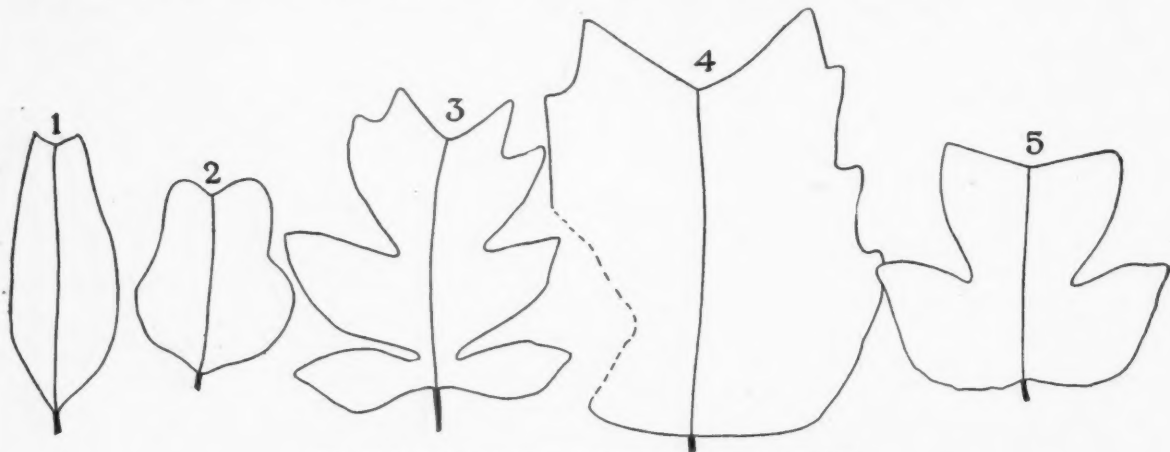
At its various angles, it may be used to rake leaves, to keep the fire lane clear of debris, or for any purpose which is served ordinarily by the naked hand. Leaves do not accumulate on the fork owing to the shape and width of the prongs.

THE PEDIGREE OF A SPLENDID TREE

IF "blood tells" in human beings, and in the lower animals as well, why should not pedigree count in the vegetable world also?

Take the yellow poplar for an example. This is the finest hardwood tree in the world, if judged by size, form, foliage, bloom, and the wide range of uses in which its wood is employed. In girth of trunk it may not equal the largest hollow sycamores; but it overtops in height all its competitors among American hardwoods; and in grace of form, and in yield of excellent lumber, no hardwood of this country equals it. The oak, which is justly called king of hardwoods, if the utilization of its wood is alone considered, must take a back seat when size of trunk

cretaceous age. It was after the coal beds were formed, but before the ice age. Coal was formed of palms, ferns, and the like, in vast swamps, as is supposed; but after that the land became dry, and it was then that the hardwoods made their appearance, and formed forests surpassing anything known on earth today. There are about five hundred kinds of trees in America north of Mexico now. The number was double some millions of years ago. The magnificent forests of that remote time seem to have sprung into existence all at once. The records in the form of leaf prints in the rocks show no gradual and slow development; but the forest's full and wonderful richness came suddenly.



YELLOW POPLAR LEAVES OF VARIOUS GEOLOGICAL PERIODS

1—Willow-leaf poplar five million years ago; 2—Fiddle-leaf poplar four million years ago; 3—Oak-leaf poplar three million years ago; 4—Giant-leaf poplar a million years ago; 5—Yellow poplar leaf of the present time.

is considered and comparison is made with yellow poplar.

There is ancestry back of this splendid tree. No royal house among the kings of earth has anything to compare with it, not even Menelik of Abyssinia who traces his line back to Solomon. When the first white men settled in the United States they made the acquaintance of yellow poplar. They never heard of it before, because it did not grow in Europe. The Virginia Indians called it "vikiok" and made canoes of it.

History goes no farther back than that in its account of the yellow poplar; but that is really the last page of this tree's voluminous and romantic history. Talk of the survival of the fittest. Here is an example of it. Geologists and palæobotanists (those who study fossil botany) are the yellow poplar's biographers. They have dug its life history out of rocks and clays where its leaves and flowers have lain buried during thousands and millions of years. This tree was in America at a time so remote that in comparison with it, the period covered by human history is as a hand's span to the distance round the world.

The records of geology show that yellow poplar made its appearance on earth during what is known as the

Among the earliest of the hardwoods in those forests was yellow poplar—not one solitary species as at present, but sixteen of them, every species apparently being as fine as ours of today, or finer. The climate was warm, and trees which now grow no further north than the United States, then flourished in Greenland. Yellow poplar was in that remote northern land, and its companions were sassafras, red gum, sycamore, bald cypress, and the "big tree" now confined to California. At that remote time yellow poplar grew in Europe where it no longer exists.

The sixteen species which once flourished in America have dwindled to one. Fifteen species perished in a tremendous catastrophe which changed the face of much of the northern hemisphere. It was a winter a million years long, known as the Ice Age. The ice killed every living plant in its path. It pushed from the north down to middle United States, burying everything. A single species of yellow poplar escaped, and that one is with us yet. It was probably growing at that time south of the region of extreme cold, and thus managed to survive, and when the ice sheet finally melted away, the yellow poplar worked its way north again, and reached the southern provinces of Canada. Some of its former companions,

notably red gum, bald cypress and "big tree," never succeeded in working their way again as far north as Canada; while the yellow poplar and the California big tree parted company during the Ice Age, never to meet again.

The apex of the yellow poplar leaf has a characteristic notch. The shapes of the leaves of all the species from the earliest till the present, have varied greatly, but the notch has always been there. Among the earliest poplar leaves were some shaped like a peach leaf, except for the notch. Then came the form like a "fiddle," but still the notch was in evidence. There was one which looked somewhat like an oak leaf, with the notch present. Changes followed until the present form was developed.

—*Hardwood Record.*

THE 640-ACRE STOCK-RAISING HOMESTEAD LAW

THE 640-acre Stock-Raising Homestead Law is now in force, having been approved by the President on December 29, 1916. All qualified homestead entrymen may share in its benefits. The law requires the Secretary of the Interior to designate the lands as "stock-raising lands" before they may be entered, and he can designate only such lands "the surface of which is in his opinion chiefly valuable for grazing and raising forage crops, do not contain merchantable timber, are not susceptible of irrigation from any known source of water supply, and are of such character that 640 acres are reasonably required for the support of a family. "This means that of necessity a classification of the lands will be made before they are opened to entry. The lands which are to be designated are those upon which it is possible to raise forage crops other than grasses naturally growing upon them, and upon which an entryman may reasonably expect to support his family upon 640 acres. Undoubtedly a portion of the remaining public lands is of the character contemplated by this act and will pass into the hands of settlers under its provisions.

To acquire title to a homestead under this act, an entryman must reside upon the land not less than 3 years and make permanent improvements thereon, tending to increase its value for stock-raising purposes not less than \$1.25 per acre, one-half of which must be placed on the land within 3 years after the date of entry. Cultivation of the land, except so far as this may be necessary to raise forage crops, is not required. Commutation of entry is not allowed. Applications accompanied by affidavits as to the character of the land may be filed in the local land offices and this will give the applicant a preferential right of entry in case the land applied for is designated, but occupancy of the land is not allowed until after it has been classified and designated by the Secretary of the Interior for entry under this law.

Where a homestead entry has already been made upon lands of the character described in this act, additional lands of the same character may be taken in such quantity as will not increase the total holding to more than 640 acres, provided the additional lands are located not more than 20 miles from the original entry. Provision is made

in the bill for withholding waterholes needed to insure public use of the remaining grazing lands and for the withdrawal of driveways needed in the movement of stock between summer and winter ranges and to and from shipping points.

When the lands suitable for entry under this act have been designated there will still remain a large portion of the public grazing lands which are not of sufficiently good character to be suitable for entry as 640-acre homesteads. Some provision should be made under which the remaining grazing lands can be protected and improved and their use for grazing purposes controlled. This could best be accomplished by the application of a plan similar to that which has been worked out for the management of grazing on the National Forests, with such modifications as may be necessary to meet the conditions in different localities. Investigations by experts of the Department of Agriculture into the production of meat on the western ranges and the possibilities of increasing the number of meat producing animals on them have developed the fact that in general the original value of these lands has been gradually decreased through unregulated grazing, and that, in their judgment, with proper supervision and control these lands could be so improved within a reasonably short time as to carry approximately 30 per cent more stock than at the present time. The conservation of the public grazing lands demands that additional legislation for the accomplishment of this purpose should be enacted at an early date.

STATE REFORESTATION

A DEFINITE legislative program was formulated at the third logged-off land conference in Seattle, says the *West Coast Lumberman*. At this conference bills relating specifically to the handling of logged-off lands were read. J. T. Condon, dean of the University of Washington Law School, and chairman of the committee on the country unit plan for land clearing, read the bill drafted by the committee to be introduced in the state legislature at the next session. Another bill was read by Hugo Winkewer, dean of the Forestry School of the University of Washington, who is chairman of the committee on reforestation. This bill has to do with the purchase by the state for reforestation of forest lands or logged-off lands.

TREES WITH A HISTORY

IS there a tree with a history in your town? What do you know about it? Is it being cared for or is it being allowed to die? **AMERICAN FORESTRY** would like to know about such trees and would be glad to receive pictures and articles, not to exceed 100 words about such trees. Such as are available will be printed in the magazine from time to time.

INTERNATIONAL FORESTRY CONFERENCE AND ANNUAL MEETING OF THE ASSOCIATION

INDICATIONS are that the Thirty-seventh Annual Meeting of the American Forestry Association and the International Forestry Conference to be held at the New Willard Hotel, Washington, D. C., January 18th and 19th will be one of the best attended forestry gatherings ever held in this country.

Governors of almost all the states, and officials of affiliated and cooperating organizations have appointed delegates to attend the conferences and many members of the American Forestry Association have signified their intention of being present.

The conferences will be busy ones. The subjects to be discussed are of nationwide importance. Almost every state in the Union has a direct interest in the proceedings, while the Association has grown to such a size that its deliberations and its actions are of great importance in public opinion.

President Charles Lathrop Pack has emphasized the importance of the meeting in his statements regarding the pine blister disease and the danger which it threatens and the members of the Association are very much alive to the necessity for prompt action in regard to efforts to stamp it out where it has appeared and to prevent it spreading to sections adjoining those infected.

Governor Whitman, of New York, at a conference of governors in Washington, D. C., in the latter part of December, called the attention of the state executives to the conference planned by the American Forestry Association, spoke of the need of a vigorous fight against the pine blister and urged the executives to send state delegations to take part in the discussion of ways and means for stamping out the disease and enlisted the assistance of the governors in the campaign being waged against it.

This subject will be discussed by some of the leading experts, men who have made a close study of the disease, and of the measures which should be taken to prevent its spread.

The addresses on public playgrounds on the National Forests, and public uses of the National Parks and the conservation of game in the National Forests and National Parks are all of unusual interest and will attract a large number who are specially interested in these subjects while the information which they give will be of particular service to the members of the Association and to the general public.

A third subject affecting the whole nation is the discussion of the advisability of prohibiting the importation

of all tree and plant stock from other continents, except such as is permitted to enter for special purposes by the Department of Agriculture. Most of the tree and plant pests which have cost, and are costing, this country hundreds of millions of damage annually, were brought into this country on imported stock. There is every likelihood that such pests will continue to come into this country unless prevented by stringent quarantine regulations. The conference is to discuss the advisability of such regulations. It is a debatable subject. Can imported stock be so cleansed that the danger of these pests is removed? Can examination of stock for importation be so regulated that nothing suspected of being dangerous shall be permitted to enter this country? These are questions to be discussed. It is a big subject, an important subject.

There will meet at the Forestry Conference the Society of American Foresters for their annual business session; the Society of Eastern Foresters; and the Committee for the Suppression of the Pine

Blister Disease of North America which will have representatives from each state where the infection has appeared or is likely to appear.

The meetings will be held on the tenth floor of the New Willard Hotel, and delegates when they arrive will be requested to register there early on the morning of January 18. Detailed information may be had at the offices of the Association, 1410 H Street, Washington, D. C.

THE PROGRAM

JANUARY 18th, 10 a. m.

Annual Meeting American Forestry Association.

Address of the President.....CHARLES LATHROP PACK
Report of the Secretary.....PERCIVAL S. RIDSDALE
Address—"Economic Justice for Lumber and Forests".....E. A. STERLING, Director American Forestry Association.
Election of Officers and General Business.

JANUARY 18th, 2 p. m.

Recreational Uses of National Forests and National Parks.

Address—"National Parks as National Playgrounds".....STEPHEN T. MATHER, Assistant to the Secretary of the Interior.
Address—"Recreational Uses of the National Forests".....H. S. GRAVES, U. S. Forester.
Address—"Conservation of Game in National Forests and National Parks".....E. W. NELSON, Chief, U. S. Dept. of Biology.
Film Story—"National Forests Attractions".....C. J. BLANCHARD

JANUARY 18th, 8 p. m.

Meetings:
Board of Directors of the American Forestry Association.
Committee for Suppression of Pine Blister Disease.
Society of American Foresters.

JANUARY 19th, 9.30 a. m.

The White Pine Blister Disease.

Address—"What is the White Pine Blister Disease?".....DR. PERLEY SPAULDING
Address—"The Present Situation" { In New England.....W. P. WHARTON
Hudson to Mississippi.....E. A. STERLING
Pacific Coast.....E. T. ALLEN
In Canada.....CLYDE LEAVITT
Address—"What Shall We Do About the Disease?".....S. B. DETWILER, U. S. Forest Pathologist.
Address—"Shall We Plant White Pine?".....C. R. PETTIS, Supt. of Forests of N. Y. State.
Address—"The Problem as a Whole".....DR. HAVEN METCALF, Chief of the U. S. Office of Forest Pathology.
Discussions and Resolutions.

JANUARY 19th, 2 p. m.

Stopping Importation of Tree and Plant Pests.

Address—"Losses Caused by Imported Tree and Plant Pests".....C. L. MARLATT, Chairman Federal Horticultural Board.
Address—"The Independence of American Nurseries".....DAVID T. FAIRCHILD, Agricultural Explorer in charge of Office of Foreign Seed and Plant Introduction.
Address—"The Necessity for a Federal Quarantine Against all Trees and Plants".....J. G. SANDERS, Economic Zoologist of Pennsylvania
Discussions.

EDITORIAL

THE PERIL OF COMBINATIONS

THERE is a marked tendency in many states to revise or reorganize their state governments in an effort to secure greater efficiency and economy. This takes the form of consolidations of various departments into a single commission, and of substituting a single executive head for the board composed of several persons. It so happens that state forestry is nearly always affected by these proposed changes; and many state forestry organizations which have existed for years and built up creditable records for good work have faced, and will continue to meet efforts to bring about fundamental changes in their status, suggested by either newly elected executives with ambitious plans of reform, or by economy and efficiency commissions seeking new and apparently simpler machinery of government. The persistence with which these suggestions recur is based on a real desire for better government, but the effort, as applied to forestry, bids fair to defeat the very ends which it seeks to attain.

Forestry has sought and attained the same form of organization in many states as is used by educational institutions, and for the reason that the demands of the work for a trained forester have led to the creation of the office as a distinct position, requiring educational and technical training. In securing this very real executive, the benefits of the board idea have also been retained by providing, as in the case of university regents, that the Board shall appoint the forester, pass on his expenses, and have the general oversight and veto on his policies and personnel.

Under this plan, state foresters of real ability have been secured and have been retained for a series of years without the office becoming a political plum to be fought over at each election. Unless this system continues, it will be impossible to get results in forestry. Trees do not grow to maturity within the two-year terms accorded most of our governors.

The great point that needs emphasis is that the system of forestry boards, who appoint the state forester, has been entirely free from the weaknesses which have brought other boards into disfavor, and has shown by its results that it is an ideal form of organization. Then why should we seek to destroy this advantage, and are we fully awake to what we are doing?

It is claimed by some that the elimination of several boards, and the substitution of a single department, will cut down expenses. We can speak only for boards of forestry. These boards are not salaried. The persons serving on them give their time and interest to the work—and under the right form of organization this is not too much of a burden. No saving is effected by dispensing with these services.

The service of the executive will be required, as before, and the superimposing of some higher official over the

forester cannot possibly increase the latter's efficiency, and can result in economy only by cutting down his salary, or forcing him to work for less—which means, a less able man to fill the place. The salary of the central executive is an additional expense, and is often considerable. The expense for clerical labor is not reduced, unless the work itself is curtailed. The forester, being himself an able executive, is capable of organizing and has already secured the best results from the force under his control, and the efficiency of this unit will not be increased by combining it with others.

Instead of improving the work, combinations of different bureaus under a single executive head infallibly tend to hamper forestry and retard its progress. The forester, on whose knowledge, interest and ability the entire work must rest, finds himself controlled by a superior whose interest is of necessity divided between the several lines of work for which he is accountable. Since it is almost impossible to find a person whose technical knowledge covers more than one line, the chief in all probability knows nothing of forestry, and is interested largely in fish and game, or agriculture. If he is indifferent, there is no appeal. Paralysis of initiative follows, and the forester becomes discouraged and either sinks to the position of a routine clerk, or resigns, to be replaced by some less able and enterprising man.

In some instances, these combinations are proposed as a means of obtaining political control of forestry work which has, by the merits of the system of state forestry boards, been kept free from the grasp of the spoilsman. Economy and efficiency in such cases form a convenient cloak to cover the real aim in view; which is to secure control of the office and of the field force, for political purposes. There can be no other object in deliberately upsetting an organization which is now giving complete satisfaction. A reform which seeks to tear down rather than build up, and which imposes changes of doubtful value on an organization already satisfactory to the public which it serves, should be viewed with suspicion. One of the most plausible arguments used to secure such combinations is that of avoiding the duplication of field agents. This applies especially to states which maintain a force of forest fire wardens, and an additional force of game wardens. The economy experts at once draw the conclusion that those two functions can be combined in the same person. Practical considerations point to just the opposite conclusion. In cities, it would be about as sensible to combine the jobs of fireman and policeman, as it would be to force the forest fire warden to assume the full responsibility for game protection. The time has not yet come when these two officials should be identified in the minds of the public. The game warden must inevitably make enemies in the course of his

duties. No simpler means of revenge exists than the setting of fires. The fire warden should be free from this handicap in an effort to build up public sentiment, especially in frontier communities most in need of fire protection. Where the duties of either office are exacting, one man cannot possibly do justice to both. Poachers would know only too well where the game warden was in case a fire occurred, and the fire warden could not be absent from his duties to attend to the arrest and trial of offenders against the game laws. Coöperation between fire and game wardens is practicable and desirable, but the actual combination of the functions of the two wardens in the same individuals has always failed, wherever tried, to give the best results. The economy and efficiency of combining game and fire wardens exists only on paper.

Not all state forestry boards have an ideal organization. In Indiana we have the anomalous condition of a board with no power to appoint or control the forester, who is a political appointee. In Wisconsin a three-headed commission exists, the forester and two others of equal rank and authority—an even worse form of organi-

zation than that existing in other states as it combines the worst feature of the board idea with that of the combination of departments. Boards might be appointed in such a way that they not only usurp executive functions, but regard the forester's office as a political job. But this has very seldom happened when the law requires that the forester be a technically qualified man.

Attempts recently made in both New Hampshire and Maryland to combine forestry with agriculture by a reorganization were wisely defeated on the basis that the existing form of organization was giving complete satisfaction.

Unless the people of a state, through their state forestry associations or in other ways keep close watch of their legislatures in the coming sessions, similar attempts may succeed in states which have made an enviable reputation for efficiency in forestry. The sophistry of the arguments used to justify these dangers is not always apparent at first glance. The present system of forestry boards has been tested for over a decade and has shown itself to be sound. It is worthy of our united and sincere support.

NATIONAL PARKS VERSUS NATIONAL FORESTS

AFTER thirty years and more of comparative neglect, and haphazard management in the Interior Department, our National Parks have finally been placed by Congress under a definite administration bureau, with a chief and the nucleus of a consistent policy. Up to this time the parks have been the plaything of each succeeding secretary,—managed as separate units, with changing personnel, and no fixed plan except to provide in some way by concessions to private enterprise, for the accommodations demanded by the public.

National Forests first originated in 1891, and in 1897 were put under a system of administration similar to that now provided for the parks. The forests remained in the Interior Department until 1905, when their administration was transferred bodily to the Department of Agriculture, in order to secure complete freedom from political appointments, consistent technical and scientific management, and the attainment of the purposes required by law, the protection of the streams, and the renewal of the forests by use.

Following this transfer the National Forest Service was rapidly established. Its nucleus and inspiration was the body of young, enthusiastic men with high ideals, trained to the work in the best schools the nation afforded, and entering this service as a career worthy of a life work. Upon the character of the service thus secured for the public, has rested the success of the National Forest Administration, which has carried the work on, overcoming enormous obstacles, and has solved tremendous problems. For the National Forester had to build up from the ground, the great fabric of a business organization which is charged with using wisely the resources of over 160,000,000 acres of land, for the best interests of all the public. Timber must be sold under a policy which will protect watersheds,

preserve portions of the forest for scenery, secure reproduction of young trees, prevent fires from the slash, permit the logger a living profit, prevent monopoly of stumps, and not work an injury by underselling private stumps. Grazing privileges must be assigned, and fees collected by a system which will protect the small farmer, prevent waste of forage, secure the proper revenue, prevent damage to watersheds and young trees, settle feuds between sheep and cattle men and utilize the resources to the maximum capacity. Water-powers must be leased under terms which will permit development and secure proper rentals, while protecting the public from the evils of monopolistic private ownership. Tourists must be cared for, camp sites, lake shores and streams protected, trails and roads built, fires fought and a thorough system of fire protection inaugurated. Tree diseases and insects must be combated scientifically and efficiently. The public must be dealt with, not merely from the standpoint of summer visitors (of whom increasing numbers make use of the National Forests each year) but, at the same time, from the standpoint of the user of wood, of grazing, the prospector for minerals, the trapper, the small farmer and the representative of big business. There is hardly a form of commercial activity nor aspect of human affairs that the foresters of the National Forest Service have not encountered, and successfully handled in the 12 years since the Forest Service was established. In the year 1916, an income of over \$2,800,000 was secured, half of which was from timber, while grazing produced \$1,200,000 and water-power rental yielded \$100,000.

With this enormous and well-trained body of public officials, and a policy consistent, elastic and successful the question will be asked—why not transfer to the Forest Service the management of the National Parks? Di-

rector Mather voices the needs of the new department in the words, "We must develop a fine body of trained and public-spirited young men to carry on the park work to its great destiny."

The Park Service needs, and must get, men of the same general character, single-minded devotion to public work, and high efficiency as has always characterized the Forest Service. *But the Park Service and the Forest Service should remain separate just as the National Parks must always remain distinct from the National Forests.*

National Parks are created for one definite purpose, to preserve untouched the beauties of natural scenery, with its forests, waterfalls, and wild life. In National Forests the same care is shown to protect small areas whose value for scenic purposes outweighs that of the lumber that may be cut from the trees. But on the 160,000,000 acres of National Forests, the immense timber, grazing and power resources are not to be locked up to serve the single purpose of scenery. A proper balance of uses for the best good of all is attained.

On the parks this policy cannot and should not be adopted. Parks are areas of such transcendent interest, such striking beauty, that the desecrating touch of commercialism must not be permitted to defile by unsightly logging, by sheep or cattle grazing, or by power houses and transmission lines the picture of the primitive wilderness. *Let the American public beware of insidious attempts to undermine this policy,* and by introducing grazing, logging and power development, to so cheapen and destroy the unique character of our parks that they will no longer differ from National Forests, and the necessity for distinctive management will disappear altogether.

There is real danger of this degradation of the park standard. Most unfortunately, the new park law al-

ready sanctions commercial grazing in the parks, and permits of timber cutting under the guise of protection from insect ravages. If the public desires to protect the National Parks and preserve them as nature planned them, two things must be demanded—the absolute prohibition of all commercial uses, and the establishment of a non-political and efficient park management equal to that of the Forest Service and as free from pressure on the part of place hunters and politicians.

The specific danger to the whole movement lies in the temptation to create large numbers of new parks, which have but little of distinctive merit to justify the sacrifice of the commercial resources which lie within them—and then, in order to satisfy the local public to permit these resources to be used on a system practically identical with and duplicating that already established by the Forest Service. Let us hold our ideals so clearly that we shall compel their adoption. *National Parks shall not be commercialized.* If scenic features are not sufficiently valuable to the local public to justify the sacrifice of timber grass and waterpower development, they shall remain as National Forests. If the sacrifice is offset by the greater value of the public good, then let the park be declared.

Practically every acre of land suitable for new National Parks is already included in some National Forest. New parks do not mean new areas reserved, but merely a new jurisdiction and policy to supplant an already established management.

Let us not mix commercial developments with park uses. In this way only can we preserve our National Parks, and maintain the present natural distinction between both policy and administration of National Parks and National Forests.

FORESTRY IN VERMONT

BY RODERIC M. OIZENDAM, SECRETARY OF THE FORESTRY ASSOCIATION OF VERMONT

VERMONT, like so many of her sister states, has suffered in the past and will suffer severely in the future because she has allowed the heavily timbered slopes of her mountains to be stripped and slaughtered, burned and slashed, while the people sat complacently by, never giving even so much as a passing thought to the needs of the generations of Vermonters yet unborn. The extreme seriousness of this situation becomes readily apparent when one considers fully the fact that the total area of forest and waste land in the State of Vermont is 3,719,000 acres, or 64% of the total area of the commonwealth.

Realizing that some active aggressive and powerful force must be brought to bear in interesting the people of Vermont in forest conservation, a small group of influential men organized the Forestry Association of Vermont in 1904, having as its object the preservation and proper handling of this large forest area for the benefit of all the people of the State and their descendants. Filled with a sincere and genuinely unselfish desire to promote the welfare of their commonwealth, these men met frequently and gave unsparingly of their valuable time and ability to the cause of

conservation. It is to these men that the State looks with thankfulness and pride for the progress of forestry in Vermont. The results which have followed their singular forethought are gratifying.

For four years prior to 1908 there had been a Forest Commissioner, not a technically trained man, but in 1908 by act of the legislature the State Forestry Department was established. There were several reasons which convinced the legislature that this action was necessary. One of the foremost reasons was the serious forest-fire situation in 1908 when a great many fires scared and blackened the mountain sides of Vermont and other States. That the action was justifiable from the standpoint of the forest-fire problem alone is evident when one considers that the expense to the State for fighting fires in the seven years 1909-1916, inclusive, has been less than for the one year 1908, even though there have been several seasons just as dry and just as dangerous. This result is attributable to the facts that the Forestry Department has become thoroughly organized under a technically trained State Forester and his assistants, one of whom is the State Fire

Warden; that there are intelligent forest-fire wardens in every town guarding the interests of the forest; that look-out stations have been built on a number of our high mountains where look-out men and patrolmen are maintained, always alert and watching for the faintest sign of a fire; and, lastly, that the people of Vermont in general have been educated regarding the damage which follows in the wake of a forest fire. Thus, the ownership of forest property has been made safer than ever before and the damage done by fires in Vermont is less than in any other New England State. At a meeting of the Society for the Protection of New Hampshire Forests held the past summer, one New Hampshire lumberman made the significant statement that the State Forester of that State had earned a salary of \$100,000 a year in lessening the damage by fire. It is quite unnecessary to say that the said State Forester did not receive what he earned.

Up to 1912 there was no remedial legislation pertaining to forest taxation in Vermont. Land owners throughout the State were compelled to cut off their timber because of excessive taxes. The State Forester succeeded in having Acts No. 40 and 41 passed by the legislature. These acts make it possible for the man who desires to raise timber to do so and to figure in advance just what his taxes will be up to 1950. Vermont, Massachusetts and Connecticut are the three leading States in the matter of forest taxation.

The State Nursery for forest seedlings was established by the legislature previous to the beginning of the Forestry Department. Since the Department was organized the Nursery has been strengthened and enlarged and a very considerable amount of planting has been done throughout Vermont on private and public lands. During 1909-1910, 572,000 trees were planted. During the six years since the establishment of the department over 5,000,000 trees have been taken from the State Nursery and planted from one end of the State to the other. It is quite safe to say that these trees, if properly protected, will be worth in fifty years between one and two million dollars. These plantations will have a stimulative effect upon the wood-using industries which will be highly advantageous and they will serve as demonstration areas to interest other land owners in reforestation.

The policy of State Forests has become solidly entrenched in Vermont because the people believe in State ownership of large forest areas in the main range of the Green Mountains. The State now owns 14,000 acres of forest land in twelve different localities comprising some of the most beautiful scenery in Vermont. The largest tract is on Mt. Mansfield, the highest mountain in the State, and in Smuggler's Notch, one of the most beautiful spots in Eastern America. This tract consists of 5000 acres, the second largest State forest in New England.

Another tract of 3500 acres is situated on Camel's Hump, Vermont's most picturesque mountain. These two areas are of sufficient size to prove an increasingly good investment for the State commercially and scenically. The people are coming to realize that the State forests are their forests, that they may wander through them at will enjoying their many matchless attractions. More lands will be purchased as soon as the right kind of opportunities present themselves. All these forests are accessible and are really and in fact a part of the life of the people.

The campaign of education carried on by the Department and the Forestry Association through numerous lectures, field meetings, excursions and through the press has stimulated a keen and healthy interest in the forest and its problems. It is safe to say that the people of no other State are more interested in their forests than are the people of Vermont.

In coöperation with the State University investigative work has been carried on and several bulletins published giving valuable information, not only to Vermonsters, but to all the people of the country who are interested in the questions of forest conservation. Vermont, like the other Eastern States, has become infected with the white pine blister disease. The Department of Forestry has carefully inspected all plantations and has the situation thoroughly in hand. Municipal forests have been made possible by act of the legislature and several cities now have their forests. As soon as the people become familiar with this policy many town forests will undoubtedly result. The Department marks trees for cutting on private lands and has just issued a bulletin on the marketing of private woodlands which should prove a help to private land owners.

Thus, briefly, it may be seen that forestry in Vermont has made rapid strides forward since the establishment of the State department composed of men who are technically trained foresters. Unfortunately, however, politics has been permitted to play too large a part in this progress. Forestry in Vermont has advanced in spite of political interferences. Free from politics one hesitates to say what might have been accomplished. Thirty States have Forestry Departments. In those States where the State Forester is appointed by the Governor or some other political officer, politics has interfered to such an extent that dissatisfaction and inefficiency are widespread, the law disregarded and trouble rampant. The preservation of the forests which we now have, the reforestation of the waste places, the education of the people to the vital need of care and forethought in dealing with the forests—these matters, in a State like Vermont, demand that the persons in charge shall be men technically trained, unhampered by politics and free to work unreservedly and fearlessly for the best interests of the State.

THE work of classifying and opening to homestead entry such lands in the National Forests as are chiefly valuable for agriculture is progressing rapidly. Already over seventy million acres have been covered by field examinations and the final reports acted upon.

INVESTIGATIONS by the Forest Products Laboratory, at Madison, Wisconsin, have resulted in the use of spent tanbark in the manufacture of asphalt shingles to the extent of 160 tons per week. The value of the bark has been thereby increased from 60 cents to \$2.50 per ton.

HOW OUR MEMBERS LIKE THE MAGAZINE

"I appreciate your efforts . . . and congratulate you on the improved condition of the magazine—AMERICAN FORESTRY. I am interested in its success, and have felt that the lumbermen generally, as they become better acquainted with the paper, will appreciate the efforts which you have made to place before the reading public the proper view of conservation and development of our timber resources."

MAJOR E. G. GRIGGS,
*St. Paul and Tacoma Lumber Company,
Tacoma, Washington.*

"I enjoy Dr. Allen's articles (Bird Department) very much and thoroughly approve of the department, as bird life is inextricably involved in the maintenance of our forests."

MAUNSELL S. CROSBY,
Rhinebeck, New York.

"I wish we could place the AMERICAN FORESTRY magazine in every home in the United States. It is a gem, and will inform the people, if we can get it into their hands."

T. P. LUKENS,
*343 Waverly Drive,
Pasadena, California.*

"The magazine now is certainly very interesting both to Forest Service men as well as to the general public, and I hope the circulation will increase in leaps and bounds in the future."

E. C. ERICKSON,
Portland, Oregon.

"The last number of the magazine is better than ever, and that is saying 'a whole lot.'"

DR. W. R. FISHER,
Swiftwater, Pennsylvania.

"The AMERICAN FORESTRY MAGAZINE has come, and it is a beauty and a joy,—thoroughly appreciated."

JOHN L. ROBINSON,
Swansboro, North Carolina.

"Hearty congratulations on the handsome appearance of AMERICAN FORESTRY for November."

ELBERT F. BALDWIN,
*Editor, The Outlook,
New York City.*

"Allow me to express the pleasure I receive from the freshness of your magazine, AMERICAN FORESTRY. The students enjoy reading it very much."

PROFESSOR JOSEPH BAILIE,
*University of Nanking,
Nanking, China.*

"The magazine is a mine of valuable information pertaining to the subjects taken up, and the illustrations are simply beautiful, and engrossing to study. I would not go on without my AMERICAN FORESTRY MAGAZINE."

MRS. D. WILLARD,
Riverside, California.

"The two issues of AMERICAN FORESTRY that I have received so far have been read from cover to cover. The magazine is instructive and inspiring. I am very much interested in the work of the American Forestry Association and will do anything I can to further it. It should have the hearty support of every patriotic American, since the work is intimately bound up with the welfare of this nation."

I. J. SCHULTE,
*Chief Accountant, Associated Advertising Clubs of the World,
Indianapolis, Indiana.*

"AMERICAN FORESTRY is a splendid magazine, full of information and inspiration."

THEODORE WIRTH,
*Board of Park Commissioners,
Minneapolis, Minnesota.*

"You have made a great magazine of AMERICAN FORESTRY,—it's of good meat from cover to cover."

CHARLES A. SCOTT,
*State Forester,
Manhattan, Kansas.*

"I take great pleasure in testifying to the very great excellence of the publication which has increased in interest with each year of its production."

DR. ELDRIDGE F. CUTLER,
Boston, Massachusetts.

"The magazine is very interesting and my neighbors are all much pleased in reading it."

A. R. BALDWIN,
Casadero, California.

"I find AMERICAN FORESTRY vastly improved as a magazine and also as a medium for successful forestry propaganda. The magazine itself is the best evidence that you are endeavoring to give us all the best there is in forestry matters and also working hard for forestry extension. I hope you prosper."

C. L. HARRINGTON,
Madison, Wisconsin.

"I wish to express my appreciation of the magazine in its new form. You are certainly doing a great work. Best wishes for a successful year."

WOODBIDGE METCALF,
Berkeley, California.

"The Club has a great many lumbermen and business men who take much interest in this magazine, and to whom it furnishes a great deal of useful information, as the articles in the AMERICAN FORESTRY MAGAZINE are original and full of up-to-date information."

ROME G. BROWN,
Minneapolis, Minnesota.

"I heartily hope for the success of your magazine. Beautiful in itself, it is, in all its departments, doing a noble work for the world."

VIRGINIA L. TOWNSEND,
Hunting Heights, Massachusetts.

"Let me take this opportunity to compliment you most sincerely on the character of the articles and the appearance of AMERICAN FORESTRY. In my opinion it is constantly improving, and it is something to be very proud of. I am very anxious to do anything I can to increase its circulation in our state."

R. C. JONES,
Charlottesville, Virginia.

"Like my friend, Dr. B. E. Fernow here, I am one of the founders of the American Forestry Association, and have watched the progress of its monthly magazine, AMERICAN FORESTRY, from very small beginnings to the fine and well illustrated magazine to which, each month, I look forward with pleasure. May I add my congratulations to those of the many others which you can hardly help receiving from both your own country and ours?"

HONORABLE A. T. DRUMMOND,
Toronto, Canada.

"AMERICAN FORESTRY has begun to arrive and we are certainly delighted with it. The illustrations are very good and its articles are stimulating."

SAMUEL E. ELLIOT,
*Woods Run Settlement House,
Pittsburgh, Pennsylvania.*

"I have urged friends to subscribe to your most excellent magazine, which I find more interesting and valuable every year."

G. F. BLUMHARDT,
Jersey City, New Jersey.

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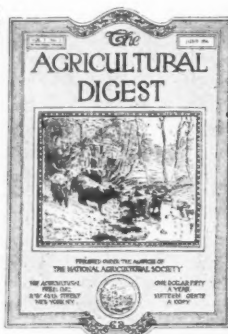
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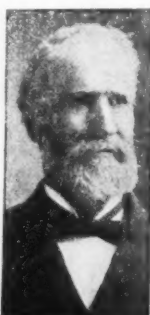
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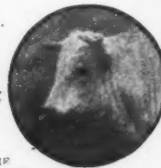
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CANADIAN DEPARTMENT

ELLWOOD WILSON, SECRETARY,
CANADIAN SOCIETY OF
FOREST ENGINEERS

During the last week in November a deputation composed of representatives of the Canadian Forestry Association, the Canadian Society of Forest Engineers, the Bankers' Association, the Canadian Lumberman's Association, the Insurance Underwriter's Association, the Woodworker's Union, the Carpenter's Union, the Mining Industry, the Railroads, the Fire Protective Association and the Settlers in Northern Ontario, waited on the Hon. Mr. Ferguson, Minister of Lands, Forests and Mines of Ontario and asked him to reorganize and make effective the Forest Fire Protection Department. After the various speakers had finished the Minister stated that he had carefully considered the matter, had consulted with other Provinces, and had decided to reorganize the service and to make it into a separate department under Mr. E. J. Zavitz, Provincial Forester. He promised that he would introduce legislation requiring all settlers to have permits from the fire rangers before burning their clearings, and that he would make all appointments to this service on the basis of merit only and not for political considerations. This will be a long step forward for Ontario and the Minister is to be heartily congratulated on it. This deputation is the culmination of several years' work on the part of the Canadian Forestry Association.

Mr. E. J. Zavitz, who will take charge of this important work, is a technically trained man, one of the first professional foresters in Canada, a member of the Canadian Society of Forest Engineers, the Society of American Foresters and the American Forestry Association. A man of the highest integrity, public spirited and thoroughly capable. He has had charge for many years of the Ontario Government forest tree nurseries and the reforestation work among the farmers and on drifting sands and recently has been Provincial Forester. Under him this fire protection work should attain a high standard and now that his Department will be free from the patronage evil we feel sure he will make a splendid record and wish him all success in his work.

At the meeting of the Technical Section of the Canadian Pulp and Paper Association one of the papers was on the relation of forestry to the pulp and paper industry and there was a very interesting discussion following it. This industry is realizing more and more its absolute dependence on the forests and this means better cutting methods and eventually planting on a large scale.

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FOR many years we in America have spent much time bemoaning the disappearance of our feathered game. But the fact that we have little game to shoot and little to eat is due solely to our own lack of initiative. We *should* have an abundance of game in the fields and on the market. We may obtain such an abundance by creating a supply equal to the demand. This can be done by increasing nature's output through game farming. And moreover, the demand may be much greater than at present, and still be easily met.

We have the land available to make America the greatest game producing country in the world. Utilize it, and everyone will have more opportunities to indulge in field sports. There will be more shooting for all of us, whether or not we have access to a preserve, because game that is raised for sporting purposes can not be confined in any restricted area. Wherever game is intensively cultivated, we find improved shooting in all the surrounding territory.

To anyone who has a small amount of land, game farming will prove profitable. The demand for eggs and for breeding stock is much greater than the supply, and will be for years to come. Pheasant eggs sell today at from \$20 to \$25 a hundred. Live birds bring from \$5 to \$7 a pair.

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But this subject is too big to be properly treated in this space. If you are interested in it, either as a prospective breeder, as a sportsman, or simply because you believe in the movement as constructive and progressive, write for the book, "Game Farming for Profit and Pleasure," which will be sent to you without cost. It tells of the subject in a most interesting and informative manner. It is well worth reading. Fill out the coupon below and a copy will be mailed you at once.

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Honorable H. C. Brewster, the newly elected Premier of British Columbia, has come out flat-footed for civil service principles and the merit system and deserves the highest praise and the congratulations of all good citizens, on his stand. In replying to a letter from the Forestry Association asking him to apply civil service principles to the Forestry Branch, he says, "I note also your intimation that efficient service could be secured best by the entire elimination of the patronage system from the Forest Service. It will be the intention of the new Government to abolish the evils of the patronage system, wherever these have been in evidence, and the Forestry Service will, in no sense, be an exception to this rule."

The membership of the Canadian Forestry Association has increased by 750 new members since last January and its influence and record of accomplishment are constantly growing. The Secretary, Mr. Robson Black, has done most excellent work and his fall lecture tour has been most successful. He is now sending a French-speaking lecturer through the eastern townships of Quebec and he expects to hold a local meeting of the Forestry Association at Sherbrooke.

The appearance of the white pine blister rust in Canada is causing much anxiety and the Forestry Association will urge Dominion action to check it. It is reported that the splendid pine forest planted some forty years ago by the monks at Oka has become infected.

Every year as soon as the snow comes it is the custom and the law that the roads must be marked by trees or poles to show where the road is. The snow becomes so deep and it is so difficult to find the track after a heavy snow or at night that were it not for these guide posts the horses would get off the roads and might not be able to get back. Then too, the roads are all single track and it is necessary to mark the turnouts so that teams coming from opposite directions may arrange where to pass. It has always been customary to use small spruce and balsam trees for this purpose but it is such a wanton waste that a movement is on foot to compel the use of alder, birch and poplar and such species as are of practically no value.

Mr. Piché, Chief Forester of Quebec, has made some very interesting studies during the past summer on cut-over lands of the River Ouelle Pulp and Paper Company, and has laid out some experiments in cutting to be undertaken by them next year. This coming summer he will make some studies on the cut-over lands of the Laurentide Company, Limited, to determine the probable future cut possible.

The Dominion Government Forest Branch have inserted a clause in their cutting contracts requiring the piling and burning of brush, and the Department of Indian Affairs

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has done the same thing but it is said will make some concession in the way of stumpage reduction to help cover the extra cost.

The Honorable Thomas Dufferin Pattullo has been chosen as Minister of Lands in the new administration formed by the Honorable H. C. Brewster. Mr. Pattullo represents the District of Prince Rupert in the provincial legislature, a section of the country containing considerable forest resources.

The appointment is announced of Messrs. F. A. Sabbaton, Laurentide Company, Ltd., representing the paper industry; Mr. Thorn. Riordon Paper Company, Ltd., the sulphite pulp industry; Mr. Hellin, of the Wayagamac Pulp and Paper Company, Ltd., the sulphate and soda pulp industry; and Mr. G. F. Duncan, the Provincial Paper Company, Ltd., the high grade paper industry, as an advisory committee to co-operate with the Forest Products Laboratories.

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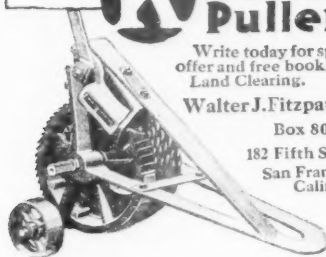
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Minister of Lands, Forests and Mines. Toronto
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Forest Insects cause Forest Fires

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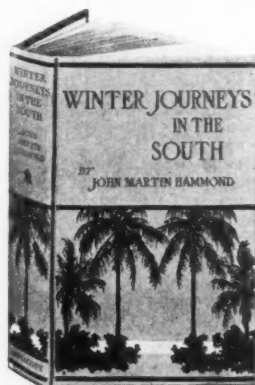
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Hardwood record, Dec. 10, 1916.—The pedigree of a splendid tree, p. 18; Wood for artificial limbs, p. 41; Eastern woods in western vehicles, p. 41-2.

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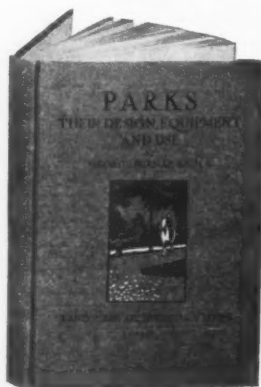
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Empire State Forest Products Association Meets at Syracuse, New York

Various angles of the forest policy of New York State were discussed thoroughly at the 11th Annual Convention of the Empire State Forest Products Association held at Syracuse, New York, recently. After a short address of welcome by Mayor Walter R. Stone and an address by George N. Ostrander of Glens Falls, New York, President of the Association, Honorable Virgil K. Kellogg of Watertown, New York, reported for the legislative committee. A report from the Forestry Committee by Professor Nelson C. Brown followed this and after other routine business Mr. Henry H. Tryon of the State College of Forestry at Syracuse, New York, read a paper on "Insurance on Standing Timber." The morning session ended with a discussion on "The Present Results of Coöperation between Private Woodland Owners and the State for More Efficient Protection of the Forests Against Fire." This was led by F. A. Gaylord, Chief Forester of Nehasane Park, New York, and William A. Howard, Assistant Superintendent of Forests. The afternoon was given over to papers on "Public Policy in Relation to Management of Forest Lands in the State of New York." by Conservation Commissioner George D. Pratt and "Hardwood Logging in the Adirondack Forests," by Professor A. B. Recknagel of the State College of Agriculture at Ithaca, New York. Following these there was a discussion on "The Relation of Hardwood to Softwood Logging in the Adirondack Forests" led by Ferris J. Meigs, President of Santa Clara Lumber Company and W. C. Hull, Vice-president Oval Wood Dish Company. At the evening banquet addresses were given by Hon. Francis M. Hugo, Secretary of State; Hon. Thaddeus C. Sweet, Speaker of the New York State Assembly; Hon. John M. Clancy, President of the Syracuse Chamber of Commerce and Frank N. Moore, of Watertown, New York.

An automobile trip was arranged for the members of the Association and the new State College of Forestry building was inspected throughout. The College of Forestry also maintained a small exhibit throughout the Convention at the Onondaga hotel.

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YALE University Forest School is a graduate department of Yale University. It is the oldest existing forest school in the United States and exceeds any other in the number of its alumni. A general two-year course leading to the degree of Master of Forestry is offered to graduates of universities, colleges and scientific institutions of high standing and, under exceptional conditions, to men who have had three years of collegiate training, including certain prescribed subjects. Men who are not candidates for the degree may enter the School as special students, for work in any of the subjects offered in the regular course, by submitting evidence that will warrant their taking the work to their own advantage and that of the School. Those who have completed a general course in forestry are admitted for research and advanced work in Dendrology, Silviculture, Forest Management, Forest Technology, and Lumbering. The regular two-year course begins the first week in July at the School camp near Milford, Pennsylvania.

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NEW HAVEN CONNECTICUT

HARVARD UNIVERSITY

DEPT. OF FORESTRY
BUSSEY INSTITUTION

OFFERS specialized graduate training leading to the degree of Master of Forestry in the following fields:—Silviculture and Management, Wood Technology, Forest Entomology, Dendrology, and (in co-operation with the Graduate School of Business Administration) the Lumber Business

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Declaration of Principles and Policy of The American Forestry Association

IT IS A VOLUNTARY organization for the inculcation and spread of a forest policy on a scale adequate for our economic needs, and any person is eligible for membership.

IT IS INDEPENDENT, has no official connection with any Federal or State department or policy, and is devoted to a public service conducive to national prosperity.

IT ASSERTS THAT forestry means the propagation and care of forests for the production of timber as a crop; protection of watersheds; utilization of non-agricultural soil; use of forests for public recreation.

IT DECLARES THAT FORESTRY is of immense importance to the people; that the census of 1913 shows our forests annually supply over one and a quarter billion dollars' worth of products; employ 735,000 people; pay \$367,000,000 in wages; cover 550,000,000 acres unsuited for agriculture; regulate the distribution of water; prevent erosion of lands; and are essential to the beauty of the country and the health of the nation.

IT RECOGNIZES THAT forestry is an industry limited by economic conditions; that private owners should be aided and encouraged by investigations, demonstrations, and educational work, since they cannot be expected to practice forestry at a financial loss; that Federal and State governments should undertake scientific forestry upon national and State forest reserves for the benefit of the public.

IT WILL DEVOTE its influence and educational facilities to the development of public thought and knowledge along these practical lines.

It Will Support These Policies

National and State Forests under Federal and State Ownership, administration and management respectively; adequate appropriations for their care and management; Federal cooperation with the States, especially in forest fire protection.

State Activity by acquirement of forest lands; organization for fire protection; encouragement of forest planting by communal and private owners, non-political departmentally independent forest organization with liberal appropriations for these purposes.

Forest Fire Protection by Federal, State and fire protective agencies, and its encouragement and extension, individually and by cooperation; without adequate fire protection all other measures for forest crop production will fail.

Forest Planting by Federal and State governments and long-lived corporations and acquirement of waste lands for this purpose; and also planting by private owners, where profitable, and encouragement of natural regeneration.

Forest Taxation Reforms removing unjust burdens from owners of growing timber.

Closer Utilization in logging and manufacturing without loss to owners; aid the lumbermen in achieving this.

Cutting of Mature Timber where and as the domestic market demands it, except on areas maintained for park or scenic purposes, and compensation of forest owners for loss suffered through protection of watersheds, or on behalf of any public interest.

Equal Protection to the lumber industry and to public interests in legislation affecting private timberland operations, recognizing that lumbering is as legitimate and necessary as the forests themselves.

Classification by experts of lands best suited for farming and those best suited for forestry; and liberal national and State appropriations for this work.

